

# THE MEDICAL JOURNAL OF AUSTRALIA

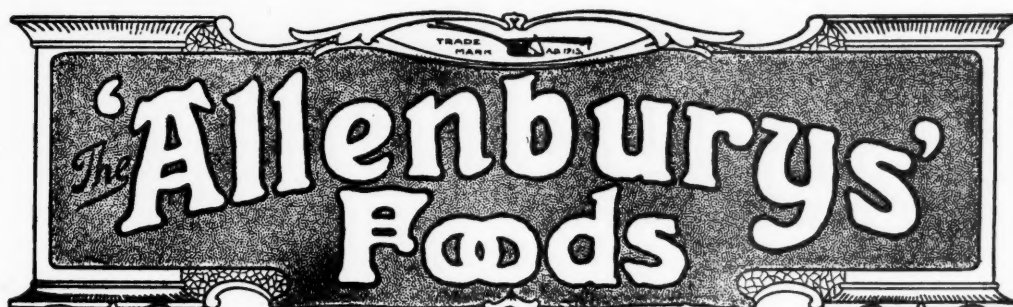
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VOL. II.—3RD YEAR—No. 7.

SYDNEY: SATURDAY, AUGUST 12, 1916.

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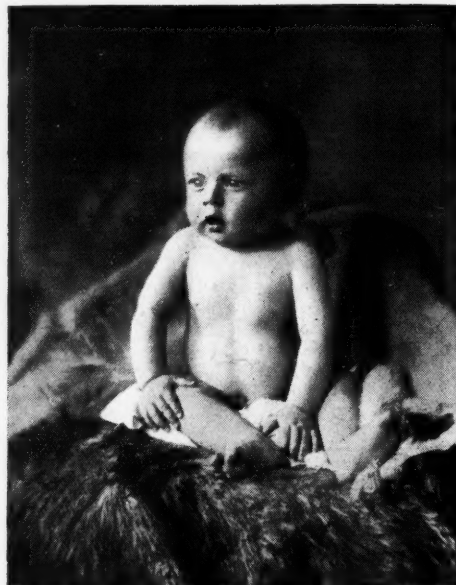
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VOL. II.—3RD YEAR.

SYDNEY: AUGUST 12, 1916.

No. 7.

## FRACTURES OF THE LOWER EXTREMITY.<sup>1</sup>

By R. Hamilton Russell, F.R.C.S. (Eng.).

Senior Surgeon to the Alfred Hospital, Melbourne.

The contention that the operative treatment of fractures should take the place of non-operative methods implies not merely that non-operative methods have been found wanting, but it implies also that the limits of human ingenuity and scientific thought have been expended upon them, and that they have been brought to a stage of perfection which cannot be surpassed, and yet have proved inadequate. He is a bold man, or something worse than merely bold, who is prepared to maintain that any work of his has reached the limit of perfection. What then is to be said when we find this attitude by implication adopted towards methods that have glaringly failed to achieve the objects for which they were designed? Some such thoughts as these caused my surgical sense to rise in revolt when, some few years ago, the distinguished advocacy of Sir Arbuthnot Lane was employed to impress upon surgeons the belief that, in view of the unsatisfactory results obtained in cases of fracture, the proper course should be operative fixation of the fragments. It is true that cases of fracture of the femur in my hands had never proved satisfactory; it is true that I had never succeeded in treating a case without considerable shortening, and sometimes worse things, as a result. Nevertheless, when I saw a surgical friend performing a "plating" operation upon a recent fracture of the lower third of the femur, while the exposed fragments were being quite easily kept in position by a dresser, who was making extension on the limb, I could not but ask myself the question, "Is it not possible to devise some mechanical means of doing what the dresser is doing?" The problem looked difficult; the utmost that I could hope for was to find some plan (the need for which is obvious) that would produce results approximating in excellence to those obtainable by operation in skilled hands, and under the favouring conditions of a well-equipped hospital.

### Physiological Considerations.

In order to understand clearly what happens to a thigh when its bone is broken, it will be well to impress on our minds certain physiological facts about the uninjured limb. For practical purposes, we may leave out of count the vessels and nerves and concern ourselves with the muscles and the bone, for the key to the correct treatment of fracture is to be found in a study of the physiological relationships of these structures. The muscles, which are numerous and powerful, are attached, some to the pelvic bone and the femur, others to the femur and the

bones of the leg, while the most important for our consideration are those long muscles which are attached above to the pelvic bone and traversing the length of the thigh find their distal attachments to the leg bones. Of these, the most powerful are the hamstrings. A chief attribute of healthy muscles is the possession of tonicity or muscular tone. Muscular tone may be expressed for purposes of practical illustration by the term "physiological stretch," which means that the normal state of healthy muscles is one of slight hyper-extension. It is, moreover, clear that the maintenance of muscular tone must depend upon the maintenance of the correct distance between the attachments of a muscle, and this, again, can only be preserved by the intact bone. Hence, the moment the femur is broken, the muscles of the thigh behave exactly as though they were stretched elastic bands which had been released suddenly by the breaking of the bone; they shorten, and the ends of the fragments overlap, necessarily. Here, however, the resemblance between the muscles and rubber bands ceases; for, while the rubber, once having been released, remains stationary and evinces no further tendency to go on contracting, with the muscles it is not so. Physiological research has shown that the shortened muscles, in obedience to certain vital laws, enter upon a continuous process of tone-recovery, which is productive, *pari passu*, of further continuous shortening, a process which is apparently checked only when the bony union becomes sufficiently firm to render further shortening impracticable. By the time this would occur, however, if the process were not controlled more or less by the devices of the surgeon, the shortening would be very marked indeed. In this way is explained the excessive shortening which is usually seen in cases of non-union of the femur after many weeks have elapsed, but the shortening is then a result rather than the cause of the non-union. Here, then, is a very simple and definite principle to work upon. The muscles are maintained at their normal length and tonicity by the "push" or resistance of the unbroken femur, and as soon as this controlling force is destroyed by the breaking of the bone, they shorten and produce over-riding of the fragments. There are two ways of meeting this. One way is to get inside the thigh and restore the muscles to their proper length by pushing down the lower fragment to its right position and holding it there until bony union shall have taken place. This is the principle we adopt when we fasten the bone together by plate and screws. The other way is to substitute for the internal push a pull from outside in the same direction as the internal push, that is in the line of the long axis of the bone. I shall not waste time in discussing which of these two plans, *ceteris paribus*, is the more desirable for general adoption. There will be complete unanimity in the view that if any way

<sup>1</sup> Read at a Meeting of the Victorian Branch of the British Medical Association on June 7, 1916.

can be devised by which the second plan can be rendered simple and practically efficient, the operative plan must be dropped. Some four or five years ago I became imbued with the belief that the extension plan was the right principle, and that it was for us to find out the reason why it had proved so unsatisfactory and persist with it until we got it to work.

#### Handling a Fracture of the Femur.

To begin at the beginning, let us picture a patient with a fracture of the shaft of the femur laid on a bed with the limb "anyhow" to whom the surgeon comes. What does the surgeon do to bring the leg into good position? The accompanying photographs illustrate (1) What the surgeon does not do (Fig. I.), and (2) What the surgeon does (Fig. II.). In the first, the surgeon has grasped the leg at the ankle and is pulling straight downwards; and however gentle and deliberate he might be, he would never get the limb into good position this way. I cannot stay to discuss the theory of this, but of the fact there is no question. I might, incidentally, remark that this is practically what is done when we find the ordinary weight and extension on a limb in the straight position, combined with a long splint or some such appliance. What the surgeon actually does — intuitively, I imagine — is shown in the second picture. Here he is seen standing by the side of the bed, and has passed one hand beneath the knee, which he lifts and bends, while the other hand grasps the leg above the ankle. Then he makes gentle traction on the limb, which is slightly flexed, abducted and externally rotated, the hand beneath the knee

being instrumental in determining the direction of the pull on the thigh muscles in the line of the axis of the thigh. However gentle and deliberate the surgeon may be, the mere fact of the injured limb being handled by a stranger will be productive of

involuntary muscular contraction and increased resistance at first; but, as the surgeon stands motionless, the patient's apprehension subsides, the muscles gradually become quiescent, then yield and allow themselves to be pulled out to their normal length. When that is accomplished, it is obvious that the broken bone must also be restored to its normal length and the fragments in their proper position.



Fig. I.

I do not know how long it will be necessary for the surgeon to stand motionless in this way to bring about this result, but it is certain that, if he were to stand so until the patient went to sleep, the result would be achieved then, if not before. Suppose

now that it were possible to imagine the surgeon maintaining traction in this position, without relaxing his efforts, day and night for three or four weeks, there can be not the slightest doubt that union of the bone in perfect length would result. Now this we have taken for our object-lesson; and the problem we set out to solve was to find some means of doing for the patient just what the surgeon would be doing in such hypothetical conditions.

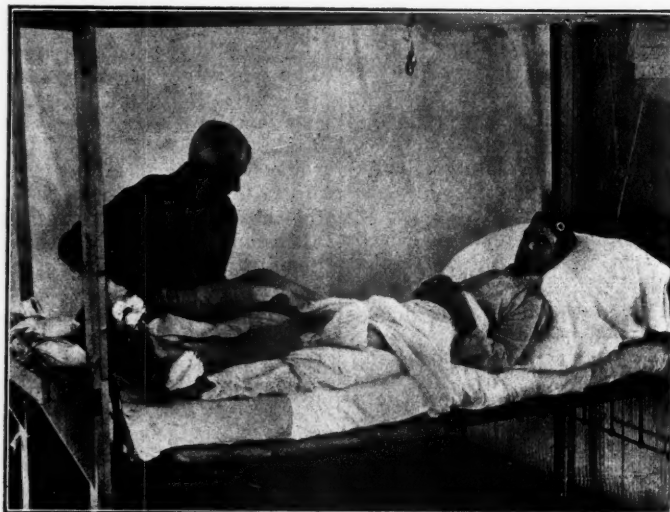


Fig. II.

We wanted to devise some appliance that, while making unceasing and regular traction on the leg, should also bend and lift the knee, and should determine the pull on the thigh muscles in the direction of the axis of the thigh. A further condition must be



that it should be self-adjusting and self-regulating, so that its efficiency should be maintained unimpaired in the presence of any movements that the patient might make. In other words, it must be an effective reality and not merely a pleasing illusion. After many trials and modifications of our methods, always in the direction of increased simplicity, I venture to submit the following plan as being, in my opinion, good.

A wooden frame, preferably a four-poster, as in Fig. III., is erected over the bed, carrying a longitudinal beam. To the two foot-posts is fastened a horizontal fixture for the attachment of a double-wheel pulley in such a way that it shall be situated (a) several inches away from the foot of the bed, (b) on a level with the patient's foot when this is raised clear from the bed, (c) nearer the corner than the middle line of the bed, so as to maintain slight abduction of the limb. The further apparatus required will be (1) a sling for the knee (an ordinary bath towel answers well); one or two small pulleys and a length of strong blind-cord; and the strappings and bandages for application of extension in the ordinary way. The mode of application of the apparatus will be readily grasped by a careful study of the figure. A single, long cord passes from the knee-sling almost vertically upwards to a

block pulley suspended from the longitudinal beam; thence it passes to one of the twin pulleys beyond the foot of the bed, thence back to the foot, thence back over the second twin pulley to

the weight (8 to 10 lbs. for an average man).

The pulling force is now acting in two directions, one passing vertically upwards from the knee, the other pulling in the long axis of the leg; but it will be noted that, by virtue of the double pulley at the foot of the bed, the horizontal traction force on the leg will be twice the vertical traction force on the knee, taking no account of loss by friction, which still further reduces the relative

amount of the vertical pull. If we construct on the diagram a parallelogram of forces, we shall find that the resultant of these two forces will fall in the line of the long axis of the thigh.

The finishing of the process consists merely in adjusting one or two pillows comfortably beneath the limb; no other apparatus is necessary or desirable. There is no fear, for instance, of rotatory displacement, for efficient extension is quite as efficacious in correcting any tendency to rotation as in correcting shortening. Above all, the heel must be free and must not at any time be allowed to rest on the bed; the moment the heel comes in contact with the bed the extension will be impaired and shortening will begin to occur. This fact has been brought out with such emphasis in the course

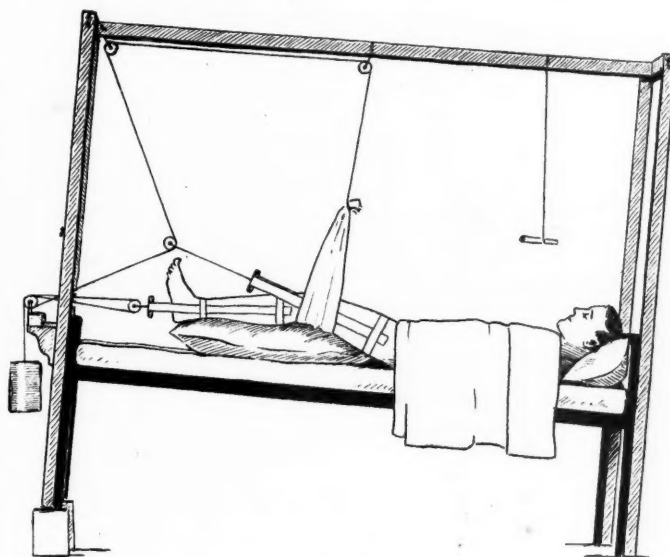


Fig. III.

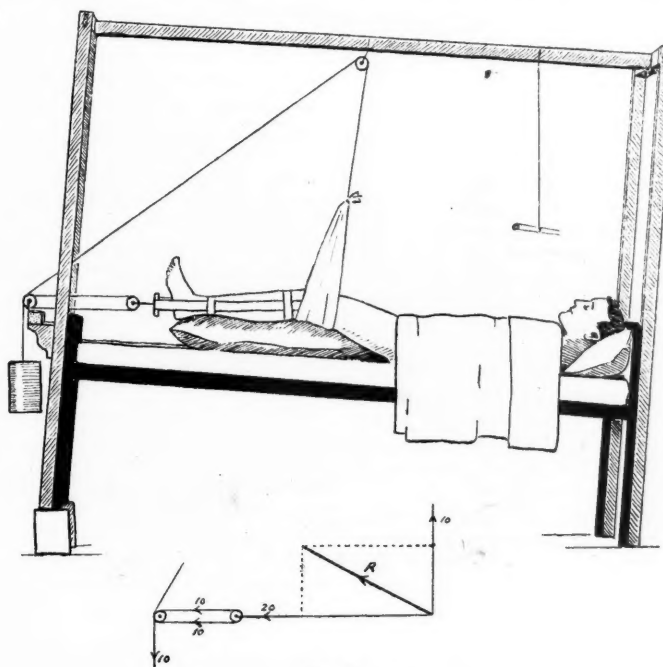


Fig. IV.

of our observations that I cannot recall, without a blush of shame, my former methods of applying extension to a limb resting with its whole length on the bed.

#### After Treatment.

It is, in my view, one of the chief merits of this plan that the after treatment demands constant alertness and activity. There is no such thing as leaving the fracture alone, or of passing the patient's bed because he smilingly announces that he is very comfortable. The house-surgeon measures the limb at least twice daily, morning and evening, and I myself do so at every visit. If the length is not perfect, the reason is sought for; if the heel of the patient is touching the bed, this will be quite sufficient explanation; or the weight may have lodged upon some portion of the bedstead, or the stirrup pulley may have come into contact with something at the foot of the bed. If either of these things have been allowed to take place, that is accounted unto somebody as carelessness, and a gentle admonition follows. For the first three weeks especial vigilance is bestowed on the maintenance of the correct length; after the lapse of that time the tendency to shortening will usually have ceased, and then our vigilance has to be transferred to another matter, the straightness of the bone. The rapidity with which the fracture will become solidly united may, in itself, be an occasional source of inconvenience, and it is quite easy for the surgeon to be "caught napping" by finding out suddenly that the bone is firmly united, but not quite straight. It is quite a usual experience to find that at about the beginning of the fourth week there will be free mobility at the seat of fracture; and that at the end of that week there will be firm union. If during this week the alignment of the bones be not very closely watched, it is possible that the surgeon may find that he desires to make a slight rectification, but that it has become difficult to do. We have found that, by this method, in ordinary uncomplicated cases, we are able to exercise almost perfect control over the length of the limb, and that sound union will usually occur in from four to five weeks. Sound union is judged to have been attained when the bone sustains forcible efforts to bend it without tenderness being experienced; if any tenderness is felt by the patient when this is done, the union is not considered to be quite sound. If no tenderness is felt, the apparatus is taken off and the patient stays in bed for another week. If at the end of that time, after he has been moving the limb about freely, there is still no tenderness to be elicited, then he is allowed to get up.

There is one complication that will interfere with the carrying out of this or any other non-operative method, the interposition of muscle between the fragments, so as to render their correct adjustment impossible. On the other hand, it is, I believe, one of the most striking merits of this method that it provides the means to prompt and certain recognition of such grave complication. As soon as it is noted that the length of the limb persistently refuses to come right, in spite of correctly applied and effective extension, a diagnosis of intervening

muscle may be made. Then the patient must be anesthetized and the fractured bones moved vigorously about, with the greatest freedom, in the attempt to disengage the fragments. We shall feel at first that crepitus is muffled or absent, but if we succeed in disengaging the fragments they should feel free and naked as we rub them together, and the limb will be drawn out quite easily to its correct length. If our efforts to right the difficulty result in failure, operation must, of course, be undertaken. Those who have had experience of this complication will, I think, agree with me that the usual fate of such cases in the past has been to remain undiagnosed until the fracture was declared ununited, after many weeks of futile treatment, by which time irremediable harm has been done. If this method proves to have changed the outlook in these cases, it will have established a claim that can hardly be over-estimated.

The following case will be found to present features of interest that seem to render it worthy of detailed study:—

A soldier fell into a quarry fracturing both thighs, and was admitted to the Base Hospital two days after the occurrence. On admission, both limbs were put up with the extension apparatus that I have described. Our initial difficulty was to decide what was the proper length of his limbs; we always measure from the lowermost point of the anterior superior spine of the ilium to the upper margin of the patella. As both thighs were fractured, we were, needless to say, thrown back largely upon guesswork in this matter. We made numerous measurements, to ascertain if we could establish any constant relationship between the measurements of the leg bones and the thigh; this, however, we had to abandon, because we found that there was no constant relationship, but, on the contrary, wide variation in different individuals. Finally, to come to the point, we concluded that the right length must be about  $17\frac{1}{2}$  or 18 inches; we could get the thighs out to 18 inches, but it seemed on the long side as compared with other patients of the same height, and I was afraid we might possibly overdo it; on the other hand, we were sure that  $17\frac{1}{2}$  was certainly a good length and could not be far wrong, and  $17\frac{1}{2}$  was decided upon. As a matter of fact, we subsequently ascertained that 18 inches would have been exactly right, and we have shortened his stature by  $\frac{1}{2}$  inch, of which he is quite unconscious.

Both thighs were solidly united in  $4\frac{1}{2}$  weeks; all apparatus was taken off at the end of six weeks, and he was out of bed, on crutches, a day or two later. He rapidly progressed with his walking, and within ten weeks from his accident he went to the convalescent home at Sandringham. Four weeks later he returned to full military duty.

To conclude this subject of fracture of the thigh, the advantages claimed for this plan are these: (1) The length is under complete control, because the extension is under complete control, is physiological in principle and is efficient. (2) As a result of this, the presence of intervening muscle is promptly made evident. (3) The patient is permitted much latitude

in raising himself up and moving about in bed, needless to say, a great source of comfort; the apparatus is, in itself, remarkably comfortable; the nursing of the patient is greatly facilitated. (4) Firm union is expected in four or five weeks; I have yet to see a case of delayed union in a thigh treated in this way. (5) To the best of my belief, this method will be found satisfactory in every case of fracture of the femur in any situation. Whether it is a fracture of the neck, or a fracture just below the ileo-psoas attachment, or in the middle portion of the bone, or just above the condyles, the method of treatment is practically the same. By this is meant that, with this principle as a basis and the extension applied in this way to all such fractures, the surgeon will find only very slight and obvious modifications necessary in order to make it serve his ends well.

#### Fracture of the Leg Bones.

Fractures of the bones of the leg present for our consideration questions of scientific principle fully equal in interest to those of the thigh. First, as to the disposition of the muscles of the leg. There are no muscles on the front or sides of the leg that pass from the femur to the foot. All the extensors and the peronei have long attachments to the bones of the leg, and their tendons lie closely applied to the bone at the ankle and on the foot. It is obvious that in any case they have practically no power of producing over-riding when the tibia and fibula are broken. At the back of the leg, however, the arrangement is very different. The powerful calf muscles have not only a high attachment to the femur, but, in addition, they are so placed as to exert powerful leverage on the foot through their attachment to the *os calcis*. Without labouring the explanation of a point that is sufficiently obvious, suffice it to say that the calf muscles are the only muscles in the leg that are capable of causing over-riding of the fragments. All other muscles not only are incapable of doing this, but, by virtue of their extensive attachments to the bone, are powerful agents in holding the fragments together in correct position, unless they are forcibly prevented from doing so. It would then appear that there is only one way of producing over-riding of the fragments, and that this can only be accomplished by bringing the foot up to a right angle with the leg. It is a fact that there is no other way except this of producing over-riding. Again, let us go back to one of our elementary laws that govern the putting up of a fracture, *viz.*, that the limb must be put up in a position of rest, such as it naturally assumes during sleep. If, now, we note the position assumed by the foot during rest, when a person is lying on his back, we find that the foot is moderately pointed, and that for him to bring the foot to a right angle calls for effort. This means that when the foot is moderately pointed in this way all the muscles of the limb are inactive and at rest. They will be equally inactive and resting when the bones are broken, so long as this position is preserved, and if the muscles are lying quietly in the normal position of rest, the bones will have no tendency to be in any other than their normal position also. Hence, if

this reasoning is correct, it is clear that the proper position for the foot when the bones of the leg are broken is one of moderate extension or pointing; the one position that must be most carefully avoided is the right angle or any approach to it. Again, let us look at the position assumed by the limb when a patient is lying at rest in bed. Standing facing the sole of the foot we see the whole limb is slightly rotated out; the patella looks somewhat outwards, and the toes point not N. to the ceiling, but nearly N.E. Whatever apparatus, then, we propose to apply in the way of a splint, it must be one that will not hamper the freedom of the limb to assume this position. I generally employ a pair of lateral poroplastic splints, moulded to the leg and foot. Supposing, however, that through not having noted and reflected upon the normal outward rotation of the limb and foot, you bandage the foot to a foot-piece that points vertically upwards towards the ceiling, and that is practically fixed, what will happen? It is clear that no control will be exercised on the limb above the fracture, but you will have established complete control over the limb below the fracture, and this will be the only part of the limb under the control of your splint. Hence, the upper part of the limb will assume its normal position of slight external rotation, while you will have effectually prevented the lower part of the limb from following it and preserving its normal relationship. In other words, the limb below the fracture will be twisted inwards, and union will take place with internal rotation of the lower fragment and foot. I witnessed an impressive example of the way such a splint as I have been discussing can create the displacement I have just described when I was with the Australian Voluntary Hospital in France. An officer had been shot through the leg, fracturing both bones, but the fact of fracture had been overlooked because the bones in such an injury are not torn away from their fibro-muscular coverings and are held in position by them. Hence, although several days had elapsed, and he had come a three or four days' train journey, no displacement was present. On his arrival at our hospital, his limb was very neatly put up on a back splint, with a foot-piece, by a very well-trained surgeon, and the next day the characteristic rotation of the lower fragment was found to be in full evidence.

It is to me a source of constant amazement that these simple principles should, as it seems to me, be so imperfectly grasped. I am perfectly well aware that there are a large number of surgical ailments affecting the leg and necessitating prolonged treatment in which it is wise to retain the foot at a right angle with the leg; not so, however, with fractures. A thoroughly well-managed fracture of both bones should be solidly united in about three weeks, and long before the expiration of that time the patient will have been performing daily exercises with his leg and foot muscles, under the surgeon's supervision, so that any limitation of the movements of the ankle from contraction of the calf muscles is so transitory and inconsiderable as to be of no moment whatever. The following case will illustrate my



meaning. A soldier was admitted to the Base Hospital with fracture of both bones of the leg. He had been put on a back splint with a foot-piece for a day or two before coming under my care, and this certainly rendered the management of it a little more difficult than it would otherwise have been. Lateral poro-plastic splints were applied, which were at first taken off daily; while the splints were off the limb was gently handled, rubbed, stroked, pressed, washed; while firmly held the patient was made to make movement of the muscles of the toes and foot, and the position of the bones was always very carefully examined. In less than three weeks the bones appeared to be soundly united and the splints were taken off; he lay in bed for a few days longer and then got up on crutches and began to "feel his feet," or his "foot." He returned to full military duty eleven weeks after the accident.

#### Active and Passive Movements.

In conclusion, I have only time to say a few words on a matter upon which I have already had more than one opportunity of expressing my views. I refer to what is known as "passive movement."

This means the moving of a damaged joint by the surgeon, with the object of anticipating and preventing stiffness in cases where a fracture has involved the joint. "Early passive motion" seems to be a phrase to conjure with among writers on these subjects, among whom I would include examination candidates. Let me suggest that we make a change and pin our faith in future to "early active motion," of which we never even hear. One might be prone to think at the first blush that the two things are probably much the same. On the contrary, they are directly opposed to one another, both in principle and practical effect. Active motion means the initiation and production of movement by means of the patient's own voluntary muscles, as distinguished from those of somebody else. Passive movement is, in my opinion, incapable of doing anything except harm. Active movement, properly regulated and supervised, is, I believe, incapable of doing anything except good. Passive movement is, and has been for a great many years, a thing outlawed in my practice. In a fracture that passes through the articular surfaces of a joint, but in which the fragments are not actually displaced, the mere presence of one or more fissures through the joint surfaces, even with a joint full of blood thrown in, cannot result in any material permanent limitation of movement, provided the joint is kept still during the process of repair. It is, I believe, impossible for stiffness to result from such an injury, except as the result of passive movement, and we shall be very near the truth if we lay it down that passive movement is by far the most potent cause of stiffness after such injuries. But the whole subject of active and passive motion is of such interest and importance that I had better be content with this bare allusion to it now. I have rather dragged in this subject by the hair of the head, for the sake of artistic completeness; for by the time we have put up a fractured leg on a splint with a foot-piece that

keeps the foot securely held at a right angle lest the weak extensors should suffer unduly, it would be a pity not to crown the edifice of our misdeeds with some early passive movement and massage. And the worst of it is that all this is in perfect accord with the accepted canons of surgery. It is none the less the simple fact that in following this procedure we shall have omitted nothing that human ingenuity could devise to defeat every one of the aims for which we are striving, and accomplish a result that is marred by every conceivable defect.

My object in this paper has been to make clear the grounds of my contention that the difficulties met with in the treatment of fractures of the leg have been almost entirely of our own creation; and if this is so, to resort to operation just because it can be safely done under specially favouring conditions is surely not the right remedy. The reasons are abundant and overwhelming that make it our right course to examine the causes of our failure and to re-study and perfect our non-operative methods; and I am in hopes that we have made some progress along that path.

I am indebted to the kindness of Professor Osborne, Professor of Physiology in the University of Melbourne, for the following note upon "muscular tone."

The contraction in muscle, commonly called tone, has been shown by Sherrington<sup>1</sup> to have as its purpose, speaking teleologically, the maintenance of posture or attitude. It is a true reflex, the adequate stimulus arising from receptors in the muscle fibres themselves. This postural reflex contraction displays a remarkable adaptation to the length of the muscle, and has so acquired the name "plastic tonus." If a muscle in tone behaved simply as an elastic band then approximation of its points of attachment would produce a decrease of tension, but, as Mr. Russell points out, in a living muscle which retains intact its connections, afferent and motor, with the central nervous system, such approximation does not produce diminution of tautness; we may go further and state that an increase of tonus may actually take place. "The bringing nearer together its insertion and origin appears to induce in the muscle a heightened tonus. This reaction may be termed, for brevity, the 'shortening reaction.'"<sup>2</sup> In the case of fracture of bone it will generally happen that passive shortening affects both synergic and antagonistic muscles, e.g., flexors and extensors together. Though one might expect some reciprocal relation between these two, yet the clinical evidence rather points to the fact that tonus or "shortening reaction" is maintained in all the muscles whose attachments are approximated. There is certainly a field here for a most interesting investigation on the physiological side, on lines that have been laid down so clearly by Sherrington.

<sup>1</sup> Postural Activity of Muscle and Nerve, by C. S. Sherrington, *Brain*, Vol. 38, p. 191.

<sup>2</sup> On Plastic Tonus and Proprioceptive Reflexes, by C. S. Sherrington, *Quarterly Journal of Experimental Physiology*, Vol. II., p. 110, 1909.



THE INTENSIVE SPECIFIC TREATMENT OF  
EPIDEMIC CEREBRO-SPINAL MENINGITIS.

By **Dr. A. Welsh, M.D., F.R.C.P. (Edin.),**  
*Professor of Pathology, University of Sydney;*

and  
**Wolfe S. Brown, M.B., M.S. (Sydney),**  
*Honorary Captain, A.A.M.C., Sydney.*

In epidemic cerebro-spinal meningitis the causal microbe is known; its mode of entrance, common habitat and relation to the specific lesions are known; and the work of Flexner has revealed an antiserum which, in his hands, had an antimicrobial action of a high degree of potency. All the conditions appeared favourable for a campaign against the meningococcus. Nevertheless, the winter epidemic of 1915 took a heavy toll of the military and civil populations throughout Australia. It is true that in some cases the patient might be overwhelmed by the virulence of the infection before the antiserum could act; but that would not account for every death, since the majority survived several days, or weeks, before they succumbed. The high death-rate suggested either that the antiserum was impotent or that the method of using it was wrong. If the antiserum were responsible for the general failure, then either it reached Australia in a degenerate condition, or it was incapable of dealing with the particular strains of the microbe concerned in the Australian epidemics. That is, in brief, a statement of the position which we set out to investigate.

We owe the opportunity for this investigation to the courtesy of the Minister for Defence and the Director-General of Medical Services, who granted a request that cerebro-spinal cases occurring among the Australian Imperial Forces should be sent to the Royal Prince Alfred Hospital for special observation and treatment. A special ward was assigned to these patients by Sir Thomas Anderson Stuart. Dr. G. E. Rennie was associated with us for the general treatment. Without the cordial co-operation of these gentlemen, the whole experiment would have come to nought. The association of a physician with a pathologist in the treatment of infective disease was a further experiment. It represented a co-ordination of effort that might be repeated in other infective processes with advantage to the patient.

Six patients suffering from cerebro-spinal meningitis from the A.I.F. were admitted to the special ward from November, 1915, to April, 1916. Since then, the decentralization of military camps made it advisable to treat the remoter cases in local hospitals. But the Principal Medical Officer asked us to continue our work on them, and one of us (W.S.B.) has been fully occupied in visiting different camps and dealing with outbreaks as they arise. Hence our personal experience has not been limited to the few cases received in the special ward. Moreover, we were in touch with other cases admitted to the Royal Prince Alfred Hospital during 1915, since we had done the greater part of the bacteriological work for them. A critical review of the hospital records revealed the fact that the treatment described in the majority of cases differed from that adopted by us, and there was a difference in results. By the courtesy of the P.M.O. we had

access to the military hospital records for 1915, and were thus enabled to put our methods to a further comparative test.

Of the six patients received in the special wards, five recovered under treatment and one died. Three were admitted in the acute stage, and three in chronic stages of the disease. All three patients in the acute stage recovered, though all were seriously ill. Of the three with chronic meningitis, two recovered and one died. Of the two who recovered, one had been ill for thirteen weeks, and was in a state of relapse following an incomplete recovery; the other had been under the care of Dr. Sinclair Gillies in the general wards, where he had been very thoroughly treated by antiserum, lumbar puncture, and finally craniotomy, with drainage of the subdural space and a lateral ventricle, before he was transferred to the special ward. The one who died had been ill for one month before admission, and had not received antiserum during that time. Notwithstanding subsequent antiserum treatment, he died with dilated and infected cerebral ventricles.

We have found records of twenty additional cases of cerebro-spinal meningitis treated in the general wards of the Royal Prince Alfred Hospital during same period, 1915-16. Of these, three patients recovered and seventeen died. Of the three recoveries, only one patient received antiserum, and that only in two small doses. Of the seventeen deaths, ten patients had no specific treatment; while in the seven to whom antiserum was given, its administration in two cases was too little and too late to influence progress, in four cases the total dosage of antiserum was probably sufficient, but either it was not massed at crucial times, or other circumstances appeared to militate against successful treatment, and in one case of great virulence it was not pressed on the second day. There were also three doubtful cases, in which a provisional diagnosis of cerebro-spinal meningitis stood on the hospital records. All three patients recovered without antiserum, but the evidence does not warrant their being included in a series of meningococcal infections.

Though the number of our cases was small, the results were striking and consistent. But the fact which made them most gratifying to us, and, we hope, of value to others, was that they were not obtained by hazard, but were the results of a reasoned campaign against the meningococcus. The general principle was to correlate the treatment with a scientific imagination of the cause and its effects. The meningococcus must be imagined (1) as gaining access to the naso-pharynx and multiplying there, (2) as entering the blood to an unknown but variable extent, and (3) as selecting a site in the membranes of the central nervous system where it produces extensive focal lesions of an inflammatory and suppurative type.

It often happens that one of these manifestations of microbial activity predominates, while others are absent or negligible. Hence there develop the well-known clinical variants of cerebro-spinal fever: (1) The catarrhal type, with localized infection of the naso-pharynx; (2) the septicæmic type, with gener-

alized infection of the blood; and (3) the meningeal type, with focal infection of the cerebro-spinal membranes. These infections present themselves in all grades of severity, from the simple carrier type, without obvious auto-infection, to the fulminating type, with death in a few hours. They also present all transitional forms, including (a) the influenzal type, with catarrh and incipient septicæmia, and (b) the type with concurrent meningeal and septicæmic infections. But all types and all grades are due to infection by the same microbe, and the principles of treatment are the same for all. The only modification is in detail. For example, when septicæmia is marked, subcutaneous injection of antiserum is indicated, in addition to any intrathecal dosage that may be necessary. When catarrhal symptoms are pronounced, an autogenous vaccine is indicated, if local disinfection does not quickly clear up the condition.

At an early stage of our work, we had evidence that the antiserum\* at our disposal was far from being impotent. Somewhat to our surprise, we found that it had a powerful germicidal action on the meningococcus. This was demonstrated by the fact that, after one or two injections of antiserum, the spinal canal was sterilized, so that cultures were unobtainable from the cerebro-spinal fluid withdrawn next day. Frequently, one injection of antiserum sufficed to disinfect the canal; rarely was it found necessary to give more than two full doses of 30 c.cm. each. The administration of the antiserum in our cases was controlled by its antimicrobial effects, as revealed by bacteriological examination of the fluids obtained by lumbar puncture, and the dosage which we recommend is based on that experience. The specific relationship between the antiserum and the infection was further indicated by the reaction which attended the introduction of antiserum, and by the clinical improvement which followed the reaction in a typical case.

The potency of the antiserum having been determined, it became necessary to reconsider the whole method of treatment. In combatting any infective process, there are two obvious lines of attack, and both are essential. One is the guidance of the patient so that his natural powers of resistance are enabled to attain their maximum development. In cerebro-spinal meningitis this is done by frequent lumbar puncture for relief of pressure, by injections of morphine for relief of pain and discomfort, and by general therapeutic measures. In some of the milder cases recovery takes place under general treatment alone, but it is probably always delayed. What is worse is that recovery is often imperfect. What is worst of all is that recovery is often arrested by an extension of the area of infection to the ventricular system. The other line of attack is directed specifically against the infecting microbe. Here, if anywhere, a scientific imagination is imperative. The mind's eye must visualize the microbe

in all its possible activities. No treatment can be effective which does not curb these activities and anticipate their effects.

The immediate indication for treatment is to reinforce the patient against the initial infection. By no means whatever can his natural resources be developed in time to cope with this emergency. The only hope of success is in the potency of the antiserum and in its timely use. Our experience has impressed us with the value of the time factor in treatment. It has led us to conclude that the first 24 hours of treatment—or lack of treatment—may influence the whole progress of the case; that the worse the condition, the greater is the need for prompt and energetic administration of antiserum; that the difference of a few hours may represent the difference between life and death in the more acute cases. Hence it is never safe to wait and see what degree of virulence will develop. But, as soon as a diagnosis of meningitis is made, or as soon as there is a reasonable presumption of its presence, antiserum should be given without the delay of a single hour. No harm is done, if the presumption should not be confirmed.

Obviously, another early indication is lumbar puncture for relief of pressure. When the needle pierces the spinal dura, turbid fluid escapes under pressure, and it is allowed to flow until the pressure is relieved, when it slows to less than one drop per second. If fluid under pressure is withdrawn too quickly, intense headache and other disturbance may be caused. This is prevented by allowing the stylette to rest in the needle, so as to regulate the rate of flow at first. Without the needle being removed, the antiserum is introduced slowly and gently. Antiserum should be warmed before use, particularly in cold districts. The full dose of 30 c.cm. of antiserum is given, if 40 c.cm. or more of cerebro-spinal fluid has been withdrawn. If less than 40 c.cm. of turbid fluid has escaped, then 15 c.cm. of antiserum is given, and another attempt made some hours later.

Lumbar puncture must be done with the strictest asepsis, as the spinal membranes offer little resistance to infection. There is always hope for a patient so long as an infection is limited to the meningococcus; there is no hope when other pyococci set up a secondary infection. Some form of anaesthesia should always be practised. For most adults, a local anaesthetic suffices; but in some adults and in children a general anaesthetic is advisable. Special needles should be used for the punctures.

When antiserum has been introduced into the spinal canal, it is important to raise the foot of the bed one foot and to remove all pillows for several hours, thus allowing the antiserum to gravitate to the upper cord and brain. The patient often complains bitterly of the discomfort, which is probably aggravated by the serum reaction. Some hours later, when the reaction is subsiding, the patient feels further relief, when the blocks are removed and the pillows replaced.

Let us suppose that the doctor has carried out our suggestions to the letter—that he has given a full dose of antiserum in the evening of the day on

\* The antiserum used in our six cases at Royal Prince Alfred Hospital was the antimeningococcal serum supplied by Messrs. Parke, Davis & Co., as that formed the hospital stock, and was used throughout the hospital series of military and civil cases alike. Later on we had experience of the antiserum prepared by Dr. Bull, of Melbourne, and of that manufactured by Messrs. Burroughs Wellcome & Co., both of which were found to be effective.

which he diagnosed meningitis—and that he returns next morning hopeful but doubtful of success. He may be confronted with an insidious condition. For, on the second day of treatment, the patient may appear worse. He may actually be much worse than on the first day, notwithstanding the antiserum he has received. If the doctor lets himself be discouraged by this fact, instead of being stimulated to further and immediate effort, the patient will probably die, and the doctor will be more than ever convinced of the worthlessness of the antiserum. Whereas, if he had persevered, he would probably have overcome the infection.

The proper course in the second day of treatment is to repeat *in toto* the procedure of the first day. In the absence of pressure symptoms, lumbar puncture must be done, in order to introduce the antiserum. The second day usually begins from twelve to eighteen hours after the commencement of treatment, and that is the time when the second injection of antiserum should be given, especially if the case is severe or the condition is worse. Altogether, not less than 60 c.cm. of antiserum should be introduced within the first 24 hours of treatment, and in bad cases this amount should be given during the first twelve or eighteen hours.

On the third day of treatment lumbar puncture is always necessary, but not antiserum, unless the patient is very ill or the initial treatment has been delayed, when 15 c.cm. should suffice. On the fourth day, puncture and antiserum are advisable, though 15 c.cm. should suffice. A serum reaction will follow. On the fifth day puncture may be necessary, but not antiserum. On the sixth day, puncture and 15 c.cm. of antiserum may still be indicated. Again a reaction will follow. From this point the patient may make an uninterrupted recovery, though on subsequent days puncture may be necessary.

Lumbar puncture must be done several times within twenty-four hours, if pressure symptoms indicate the need; but antiserum should not, as a rule, be given oftener than described. It is, however, of the first importance, after the patient has survived the initial toxæmia, that he should not be allowed to drift into a sub-acute stage of the infection. Any tendency in that direction must be countered by massed doses of antiserum and more frequent lumbar punctures. A relapse must be treated as a fresh infection, with immediate antiserum injections at the times and in the doses specified. That is, in outline, the treatment of a typical case of cerebro-spinal meningitis.

A reaction may follow each injection of antiserum, beginning in about an hour and lasting about twelve hours. It is indicated by rise of temperature, increasing discomfort and restlessness, pains in the head and back of neck, which are often severe, making the patient cry out, and requiring relief by morphine  $\frac{1}{6}$  grain and atropine  $\frac{1}{150}$  grain, repeated in four hours if necessary. Improvement follows a typical reaction. This serum reaction may be masked in the early days of treatment by the general condition of the patient. Nevertheless, injections of morphine, as above, will often give relief. The re-

action must not be confused with pressure symptoms requiring puncture.

A relapse is not an uncommon incident in the ordinary course of treatment. It is due either to a recrudescence or to a re-infection. Recrudescence occurs when the meninges have not been sterilized throughout their whole extent, and have become gradually invaded again by the cocci surviving *in situ*. Against this contingency the efficacy of the initial treatment is the only safeguard. Re-infection occurs when the cerebro-spinal site has been disinfected, but has been again infected from the naso-pharynx. It is obvious that, if the microbes have once travelled from the naso-pharynx to the meninges, there is no security that they will not repeat the journey if the opportunity lasts. Hence, a third and fundamental indication for treatment is to regard the naso-pharynx as the primary source of infection and the possible source of re-infection, and to begin disinfectant treatment at an early stage. In two of the cases under our observation, we thought that we could trace this connexion, as permanent improvement did not set in until naso-pharyngeal disinfection was added to the other means of treatment. Incidentally, the early disinfection of the naso-pharynx has the further advantage that it minimizes the risk of transferring presumably virulent microbes to those in attendance on the patient or in his neighbourhood.

Disinfection of the naso-pharynx is required in patients, in contacts and in carriers. One method is to use a spray and a paint. The spray may be undiluted hydrogen peroxide, or some equivalent, such as 1 part of a 9% argyrol solution, with 9 parts of 1 in 1,000 solution of potassium permanganate. The paint may be formalin in glycerine, or tincture of iodine in glycerine, or *liquor sodæ chlorinatae*. Those in attendance on the patient should practise the same careful disinfection, and nurses should wear gauze masks. Where it is not contra-indicated, the most effective means of sterilization is the naso-pharyngeal bath. The subject lies on a table with his head hanging vertically downwards over the edge. The naso-pharynx is thus completely inverted, and can be filled up to the level of the nose and mouth with disinfectant solution. The best for this purpose is a dilution with equal parts of water of the ordinary 3 volume % hydrogen peroxide; the next best is a 1 in 1,000 solution of potassium permanganate.

Chronic stages of the infection present different problems. Undoubtedly some patients survive the acute stage without antiserum, or with a lesser and later administration than that recommended by us. They then enter upon a chronic stage, in which they are kept alive by a long course of lumbar punctures. It is not surprising that some of these patients should ultimately survive the infection, when it is remembered that the meningococcus possesses a low virulence, though it may develop a high virulence. Hence there is always a chance of saving life without antiserum, when the first onset of the microbes has been withstood. But, while repeated lumbar puncture may relieve the recurrent pressures of the inflammatory exudates, it does not prevent the pro-



gressive and permanent damage to the central nervous system that may follow a long-standing infection of the membranes. Evidence of this damage is found in the mental changes in convalescents, where a cheerful disposition has become morose, or an alert mind has been dulled. Recoveries of that kind rank as therapeutic failures.

No doctor would dream of leaving a suppurative inflammation of the pleura, or of the pericardium unchecked for weeks or months, if he had the means of arresting it. All the more reason that he should do his utmost to arrest a similar process in the cerebral membranes, before the inflammation has spread to important subjacent structures. It is a pathological impossibility that an endothelial membrane can be in a suppurating condition for weeks without an extension of the inflammatory process to the deeper tissues. The full effect of this extension it is impossible to estimate, but there are indications that it may profoundly affect the mental state of the survivor. Prompt and thorough antiserum treatment offers once more the only chance of averting this disaster. When a chronic phase of the infection has developed, an autogenous vaccine should be added to the other means of treatment.

There is yet another risk attendant on a long-continued infection of the meninges. The microbes may extend the area of invasion to the central cavities of the brain and cord, where they are practically inaccessible to antiserum. Later inflammatory adhesions may completely isolate the ventricular system and its contents. The heroic measures of craniotomy and tapping a lateral ventricle may succeed in saving or in prolonging life, and without a doubt the unfortunate patient should be given that last chance. But it must be regarded as a desperate means of trying to redeem the consequences of the unsuccessful course of treatment. When death occurs at a chronic stage of the meningitis, the dilated ventricles, with their purulent contents, form a conspicuous feature of the autopsy.

All considerations, therefore, lead to the same conclusion that the timely use of the specific antiserum is the first condition of successful treatment. Flexner himself fully recognized the importance of its early administration. From the case records examined, however, we know, as a matter of fact, that intensive specific treatment was not generally practised during the epidemic of 1915. That is our main reason for publishing not only the principles of the specific treatment suggested by our experience, but also definite recommendations based on our small, though consistent, series. We believe that a more immediate and more sustained offensive against the meningococcus would greatly lessen the proportion of deaths and of imperfect recoveries in cerebrospinal meningitis.

#### Addendum.

Since reading this paper we are in a position to state that we have recently directed the specific treatment of 27 additional cases (18 military and 9 civil) of epidemic meningitis. All the patients were seriously ill. Five have died, and 22 have made, or are making, good recoveries. In three of the patients who died, there was a failure to carry

out intensive treatment. Hence, these deaths do not count as failures of the intensive method. The two other deaths occurred in men who were admitted for treatment on the fourth day of the illness, and died on the sixth and ninth days. In both cases intensive treatment soon disinfected the spinal canal. In both the fluid obtained by lumbar puncture diminished, but cerebral pressure-symptoms did not diminish. An examination was refused in the first case, but granted in the second, where there was found an acute hydrocephalus, with a thick layer of fibrin and pus over the roof of the fourth ventricle, but practically no fluid external to the brain and cord. Ventricular drainage, therefore, is not merely the last resort in chronic stages, but may be urgently indicated at an early stage. We did not appreciate the urgency in time. We are indebted to Dr. E. W. Fairfax for his cordial co-operation in eight of the cases, and to Captain Keith Inglis and Dr. Nowland for their care in putting the intensive method to practical tests.

Our original series of six cases had only an experimental value, but, when the more recent series of 27 cases is added, the numbers begin to have a statistical value as well. The general result is that we have been more or less responsible for the specific treatment of 33 unselected cases (none of which were mild), with six deaths and 27 recoveries. But the argument for immediate and intensive specific treatment is stronger than these figures indicate. For reasons beyond our control, such treatment was not carried out in five of our cases, with a proportion of four deaths to one recovery. In the remaining 28 cases, intensive measures were undertaken from the beginning of treatment, with a proportion of two deaths to 26 recoveries—the deaths occurring in the patients who succumbed to intra-cranial pressure unrelieved by lumbar puncture. Our further experience indicates that few of the more serious infections yield to specific treatment more readily than epidemic meningitis, but that treatment must be immediate, intensive, unremitting. Given these conditions, it is no exaggeration to say that the efficacy of the antiserum is comparable to that in diphtheria. In both infections, if the case be treated early, the specific antiserum may act with dramatic suddenness. The accident of the anatomical lesion, the greater initial virulence, and the fact that the toxæmia is not to the same extent neutralized by the antiserum, make the treatment more complicated and more difficult in meningitis than in diphtheria. But these differences only emphasize the need for prompt and proper measures. It is universally recognized that delay in giving the antiserum may be fatal in diphtheria. It is not generally recognized that a corresponding delay is more likely to be fatal in the more serious condition of meningitis.

To sum up, we suggest certain causes of failure:

- (1) The most important is the failure to begin specific treatment at the onset of the infection, thus allowing the toxæmia to develop.
- (2) Next is the failure to concentrate 60 c.cm. of antiserum into the first 24 hours of treatment.
- (3) There is the failure to relieve subdural pressures when necessary—an



indication often overlooked when fluid is poured out after injections of antiserum. (4) A possible cause of failure is excessive repetition of antiserum, which may be not only wasteful but hurtful. Apart from great virulence, delayed treatment, and relapses, it is seldom advisable to continue giving antiserum longer than we have recommended. The summation of reactions from a daily overdose of antiserum may result in an arrest of improvement, until the antiserum is cut off and lumbar puncture is done more frequently. (5) Some of our cases relapsed before the final recovery. In practically every instance the relapse was due to a failure to appreciate and carry out the later stages of intensive treatment. In every case the relapse was successfully met by massed doses of antiserum and more frequent punctures. (6) There may be failure to realize that constant watchfulness is essential. In every hospital where cerebro-spinal cases are treated, a medical officer must be detailed, whose first duty is to these patients alone. He must be prepared to give antiserum at any hour without delay, and an emergency supply must be kept on hand. He must be in touch with acute cases from 8 a.m. to midnight, and longer if necessary. No other work must prevent his doing lumbar puncture when indicated. A routine visit once or twice a day is futile during the critical stages.

AN OPERATION SPECIMEN CONTAINING INFLAMED  
APPENDIX, PYOSALPINX, HYDROSALPINX,  
FIBROTIC UTERUS AND FIBROID POLYP,  
WITH NOTE ON THE TECHNIQUE  
EMPLOYED.<sup>1</sup>

By **Ralph Worrall, M.D.R.U.I., M.Ch.,**  
Gynaecologist to the Sydney Hospital.

The specimen which I am exhibiting illustrates the multiplicity of the lesions which may be encountered in pelvic surgery, the difficulties in dealing with them, and the vagaries as regards position of supposed constantly placed structures.

The specimen consists of the much-enlarged uterus showing cystic degeneration of the cervix and a fibroid sessile polyp of the fundus. On the right is a large pyosalpinx which crosses over to the left beneath the left tube, transformed into a huge hydrosalpinx, and transplanted to the right side. The appendix is seen attached to the proximal portion of the pyosalpinx.

On opening the abdomen the pelvic inlet was found sealed by adherent omentum, sigmoid and bladder. The omentum was divided, ligatured and raised up. The very dense matting together of structures thus disclosed made it evident that the task of removal would be difficult. With my reflecting retractor in the lower angle of the wound a careful survey was made of the whole field, and the most promising point for attack selected. This seemed to be on the right, where the caecum and appendix were adherent to the pus tube. The appendix was crushed at its base, ligatured, and severed from its

caecal connexions, the outer layer of the meso-caecum divided for an inch or two, and the bowel mobilized and lifted up. This enabled me to ligature the ovarian vessels and round ligament on the right. The finger was pushed down to the uterine; this vessel was clamped and divided, and the vagina cut into through the right fornix. This incision was extended backwards, the Watson hook then fixed in the cervix, which was thereby pulled upwards, and the bladder separated from below up *à la Doyen*; the remaining connexions, left uterine vessels, round ligament and left ovarian vessels, were thus made accessible, and severed with remarkable ease.

The vaginal mucosa was sutured to the peritoneum anteriorly and posteriorly; all raw surfaces were carefully covered over; a gauze drain was passed from the pelvis into the open vagina, and the abdomen was closed with five layers of sutures. The operation lasted just 60 minutes, and owing mainly to the careful prophylactic hæmostasis there was no shock. Recovery was easy, as shown by the hospital chart.

I am indebted to Dr. Cedric Bowker for expert assistance.

Members may possibly be interested in seeing this reflecting retractor for the lower angle of the wound which I have just referred to as such a valuable aid in the operation. I brought the instrument under the notice of the Branch 16 years ago.<sup>1</sup> It seems to be quite unknown, notwithstanding the great superiority which it possesses over the "Doyen" or any other retractor in the market. The "Doyen" retracts the sides of the abdominal incision; it does nothing else. My retractor does the same and far more, inasmuch as it holds up the bladder in a Wertheim's operation or other hysterectomy, or holds up the uterus in a pus tube operation, while all the time it is reflecting light into the pelvis, enabling the eye to discern the exact condition, the most intricate relations, or the most remote bleeding point.

There have no doubt been many fatalities due to injury to the pelvic colon, because in a bad pus tube case the surgeon failed to distinguish the line of cleavage between the pus sac and the bowel. The risk of such a catastrophe is minimized by the routine use of this reflecting retractor.

THE PRICE OF SALVARSAN.

Our attention has been drawn to an attempt on the part of some pharmaceutical chemists to retail small stocks of salvarsan and neo-salvarsan, which they have been holding, at exorbitant prices. One firm is offering 0.4 gramme tubes of salvarsan at £2 10s. to the medical profession and £3 5s. to the public, while 0.6 salvarsan is offered at £6 to the medical profession and £9 to the public. Neo-salvarsan is offered at £1 15s. to the profession and £3 3s. to the public. It is assumed that these stocks were procured before the outbreak of war, when the price varied between 8s. and 10s. per tube. Practitioners are warned not to entertain this impudent demand. We cannot conceive any justification for an increase in price of from 500% to 1,500% in the course of a little over two years.

<sup>1</sup> Read at a Meeting of the New South Wales Branch of the British Medical Association on July 14, 1916.

<sup>1</sup> *Australasian Medical Journal*, November, 1900.

## British Medical Association News.

### SCIENTIFIC.

A meeting of the Victorian Branch was held at the Medical Society Hall, East Melbourne, on June 7, 1916. Dr. A. V. M. Anderson, the President, in the chair.

Mr. Hamilton Russell read a paper on "Fractures of the Lower Extremities" (see p. 107). At the conclusion of the paper he exhibited lantern pictures illustrating the position of the fragments in fractures treated by the methods described. One picture was shown in which the position of the tibia and fibula was as good as it would have been had plates and screws been employed. Union had taken place in three weeks. A second picture was a skiagram of femora from a case of double fracture referred to in the paper. It was pointed out that when there was any shortening of even an inconsiderable degree, there must be overriding of the fractured ends.

He also showed a picture of a tibia fractured by shrapnel. This fracture had been treated in England. Union had already taken place, but there was an abrupt enlargement of the bone, with an unhealthy condition of the skin, which had an unhealthy look. It was discovered that several fragments of compact bone had been driven into the surrounding tissues, and that a mass of callus had been formed around them. Six or eight of these fragments had been removed and the wound healed. The man was restored to military efficiency within a few weeks. A case presenting certain analogies was that of a bullet wound in the foot. The foot had become greatly hypertrophied, and the condition resembled elephantiasis. This was due to the irritation of small bony fragments resulting from a comminuted fracture of one of the metatarsal bones. The whole of this bone and subsequently two toes were removed. The hypertrophy gradually disappeared. The soldier had been passed as fit for military duty.

The next picture was from a case of gunshot wound of the lower part of the radius. There was a considerable interval in the bone, and great difficulty had been experienced in bringing the fragments together. A good result had been obtained by bridging. This had been accomplished by making a longitudinal section of the radius, pushing the piece into the interval and fixing it there by wire. Another slide was exhibited, to illustrate a bone graft taken from the fibula to fill a gap in the radius. The graft had become absorbed and new bone had formed in its place.

Mr. Russell exhibited a slide of a lower jaw which had been built up from a bone graft derived from the patient's fibula. A moderately firm jaw had resulted, although it was impossible to get it into proper relationship with the upper maxilla, to enable the man to masticate his food properly.

The last slide shown was that of a bullet wound of the femur, which had resulted in an extensive out-growth of *myositis ossificans* in the adductor muscles. The bullet had passed from the lesser trochanter and had traversed the thigh, apparently without having touched the bone. A hæmatoma developed, and suppurated later. The man was regarded to be unfit for military service. The skiagram revealed a misty shadow, and on further examination it was found that there was a mass of bone in the adductor region like coral-island formation. At the operation the mass was disentangled from the adductors. It revealed the structure of bone, and some of it was like the thoracic bone of a chicken, branching out and closely adherent to the muscles. Mr. Russell confessed that he was at a loss to explain the pathology. After the operation the soldier got quite well and returned to military duty.

Mr. G. A. Syme said that the method of treatment of fractures of the lower extremity suggested by Mr. Russell was in some respects so revolutionary that he did not feel prepared to criticize it before he had had some experience of it. The method seemed to him to be scientific and logical. There was one thing that made him hesitate in accepting it. That was the pictures of fractures shown on the screen. Mr. Russell was pitting his method against that of operation. The anatomical results seen on the screen were not as satisfactory as those obtained by Sir Arbuthnot Lane. Assuming that the operation was done by a skillful surgeon, he could be certain of getting a per-

fect anatomical result. The views put forward were revolutionary more particularly because splints were discarded altogether. No harm could be done by putting a limb into a splint, when traction pulleys were used to counteract the lateral bending. The same thing held good in respect to rotation to prevent lateral bending. It had been found possible in practice to dispense to a considerable extent with splints in cases in which they were formerly considered to be necessary. In some cases of compound fractures due to bullet wounds, it had been found impossible to apply splints in the old way. A great deal had been done by adopting the principle enunciated by Mr. Russell, and many splints used in France were constructed in such a manner as to admit of traction on the femur being applied in the line of its axis. In regard to fracture of the bones of the leg, he was in accord with Mr. Russell. Back splints with foot pieces distorted the limb into unnatural positions. The action of the muscles tended to produce deformity, but by dividing the *tendo Achillis*, the muscles could be put out of court. This method had been suggested by the late Sir Thomas FitzGerald; the speaker had found it very satisfactory. His own practice in the treatment of fractures was to take a skiagram in both directions after setting. If a satisfactory position were obtained, no operation was considered to be necessary. Mr. Syme said that he had been greatly impressed by the good results of Lane's work in England, and by his magnificent technique. If the procedures were carried out as Lane taught them, the surgeon could not fail to obtain satisfactory results.

He pointed out that union seemed to take place more quickly with Mr. Russell's methods than when splints were used. How much movement was to be permitted could only be determined by actual experience. He confessed that he was unable to explain the peculiar condition shown in the last picture thrown on the screen. The condition was not infrequently seen, and was a form of *myositis ossificans*. He recalled the case of a man who had had a severe kick on the thigh from a bullock. A hæmatoma developed on the inner side of the thigh. The swelling persisted for many months, and when the patient was admitted into hospital, he was found to have a large swelling in the affected region, which was palpably bone. At the operation it was found that a complete shell of bone enclosed the original hæmatoma and scattered through the hæmatoma were spicules of bone like coral. He had failed to find an adequate explanation for the bone formation in the literature on the subject. In another case, that of a medical student, whose father was a medical man and objected to an operation, the same formation had been gradually absorbed. It was situated in the *quadriceps extensor* muscles; the patient at first had been unable to flex his knee, and there had been great stiffness of the knee-joint. He agreed entirely with Mr. Russell in regard to passive movement; he could testify from personal experience. He had suffered from a poisoned hand, and his fingers became stiff. The surgeon under whose care he had been placed had insisted on bending the fingers; they got worse. Then he had been persuaded to leave them alone; Mr. Syme had used them actively, with the result that they had become perfectly well.

Dr. Kent Hughes said that he had acted as Sir Arbuthnot Lane's house surgeon when he was in England recently, and he could assure his hearers that the cases were not always a success. He recalled the case of an officer who returned with a screw loose from a plate in his leg. He had had a bullet wound, with comminuted fracture, and the plating method had been adopted. There was so much simple, sound common-sense in Mr. Russell's method that he expected to see considerable improvement in the treatment of fractures of the lower limbs.

Dr. A. E. Taylor said that Dr. John Bloxam, of St. Bartholomew's Hospital, had been carrying out for many years the identical treatment advocated by Mr. Russell. His method consisted in the application of a Thomas's splint, but the framework was employed not as a splint, but as a means for applying extension. This method had been used for many years with excellent results. For 16 years Dr. Taylor had been seeking a case to treat in this way, but the patients had either gone to the hospitals or had consulted one of the Melbourne surgeons.

(Continued on page 124.)

## The Medical Journal of Australia.

SATURDAY, AUGUST 12, 1916.

### The Healing of Fractures.

The contribution to our knowledge of the surgery of fractures of the lower extremity published in the present issue will attract much attention, partly because it emanates from the pen and brain of Mr. Hamilton Russell, and partly because the ideas contained in the article were the result of an attempt to mould practice to physiological facts. The article should be considered from two aspects, and we venture to suggest that final judgement in regard to both should be suspended until further evidence is available. The first aspect is that of the practical surgeon. For reasons which will receive attention later, Mr. Russell alters the usual method of bringing the fragments of the fractured bone into exact apposition, and of keeping them in this position. He has embarked on a campaign to get rid of the necessity of employing operative means to attain good results. It must, however, be pointed out that, because Lane has found that non-operative results obtained in the London Hospital do not compare with the operative results obtained by himself, operation is not necessarily essential for satisfactory union. Lucas Champonnière, William Bennett and many other surgeons have demonstrated that good union may be obtained by non-operative measures, provided that the same amount of care is expended on the individual case, not only at the moment of setting the fracture, but also during the whole time, until fixation has taken place, as the surgeon would expend on his operated-on patient. Mr. Russell's methods will require all the care, skill and attention that the general practitioner or hospital surgeon can expend on them for the best results to be ensured. Experience alone will teach whether the ingenious device of applying traction in the direction of the long axis of the femur and of placing the leg in a position of physiological rest or relaxation in the case of fracture of the tibia and fibula will yield in the hands of others results as satisfactory as those which Mr. Russell has obtained.

Mr. Russell reasons that the maintenance of muscular tone must depend on the maintenance of the correct distance between the fixed attachments of the muscle. He essays to deal with the problem of muscular tone, without taking into consideration any structures other than muscles. As far as the physiological basis of the production of shortening is concerned, it would seem that the work of Sherrington, to which Professor Osborne calls attention in his interesting note, is incapable of throwing full light on the problem, because, in the one case, it is necessary to consider the position of a simultaneous shortening of both synergetic and antagonistic muscles due to a break in the continuity of the bone, while in the other we have knowledge of the variation in tonus caused by the approximation of the attachments of one set of muscles, with the corresponding lengthening of the antagonists. We know that the bringing nearer together of the origin and insertion of a muscle appears to induce in the muscle a heightened tonus, the so-called shortening reaction, whereas forced stretching, which leads to the lengthening of the distance between the origin and insertion causes a relaxation of the heightened tonus, a condition of relaxed tonus, spoken of as the lengthening reaction. The reflex are essential for both the shortening and the lengthening reactions is the reflex arc of the muscle affected. In other words, the two reactions are autogenic. From this it must not be assumed that the reactions are, strictly speaking, reflexes. They are, in all probability, more akin to the knee jerk. Further consideration of the physiology of muscle reveals that the activity of the arc seems to confer on the muscle fibres a state of tonus with properties which render the muscle plastic in the sense that, when subjected to mechanical change, such as shortening or lengthening, they retain the shortening or lengthening impressed on them. Moreover, it would seem as if the cerebellum acted as a co-ordinator or moderator for the various groups of muscles. This synergia must surely play some part in the gross disturbance of the points of origin and insertion of both extensors and flexors. We would therefore point out that it is not admissible to apply the facts as elicited in regard to muscles whose points of attachment are varied within physiological limits



to the case of antagonistic muscles, whose points of origin and insertion may move beyond these limits and whose synergetic control has undergone a wide modification from the normal. It may be that Mr. Russell's practical means of securing apposition of fractured ends of bone may throw light on this still obscure physiological problem, but it is tolerably certain that further researches are needed before the gap which exists between his explanation and that of Sherrington can be bridged.

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#### UNTIL VICTORY IS ASSURED.

The fourth of August has passed twice since Britain's "contemptible little army" took the field against the trained military hordes of the enemy. With the army itself a medical journal has nothing to do. Recent events on the Somme, the whole of the Gallipoli campaign, and the moving activity in the neighbourhood of Armentières tell their own tale of the value of the British Army. The short pause in the daily life of civilians at mid-day on the anniversary of the declaration of war was marked by the passing of innumerable resolutions, pledging the whole of the population to spend every ounce of available energy in supporting the Empire until victory is assured. These resolutions must not be empty promises, entered upon in a moment of enthusiasm, and forgotten in the turmoil of every-day affairs. They must be solemn pledges, binding each man to do what lies in his power to contribute to the one aim of all. Medical practitioners stand in a peculiar position, and have special duties to fulfill. The fact that an army needs a greater portion of surgeons than the civil community necessarily imposes a severe strain on the medical profession in warfare. But, as has frequently been pointed out, the needs of the Empire in regard to medical service can and will be met by the members of the medical profession in the Commonwealth.

In the *British Medical Journal* of June 24, 1916, members will read of the appeal of the War Office to medical men between 45 and 55 years of age to accept commissions in the Royal Army Medical Corps for whole-time general service in the United Kingdom. This appeal may be translated to the conditions obtaining at the present moment in Australia,

and medical men may take the lesson to heart. In a recent issue we called attention to the need for young men for service abroad. But others are needed for service with the Army Medical Corps. Those who are unsuitable for service abroad, either on account of gathering years or for other reasons, may be able to undertake home duty with the forces and contribute materially to the efficiency of the troops leaving the Commonwealth to face the enemy, as well as to assist in ameliorating the condition of those who have returned home incapacitated by wounds or illness. And, lastly, a certain number must remain on duty to look after the needs of the civil community. Let each man ask himself what duties he is fit to undertake, and which would be of the greatest value to the Empire. Having found a reply to this question, let him see that he carries out these duties. It will happen, perhaps not infrequently, that a man offers his services to the Department of Defence, and some delay occurs before his services are accepted. When this takes place, he should remember that the organization of the Army Medical Service is young and imperfect, and clock-work precision in so large a machine is not easy of attainment. The individual's duty is to offer himself for any work he feels himself competent to undertake, and to accept the position whenever it is offered to him. In this way, and in this way alone, can each member of the medical profession fulfill the pledge contained in the resolutions passed on August 4, 1916.

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#### THE WELLINGTON LODGE DISPUTE.

The prospect of an early settlement of the dispute between the Lodge doctors and the Friendly Societies in Wellington, New Zealand, appears to be distinctly bad. Negotiations led to an apparent impasse; the men holding Lodge appointments appealed to the Wellington Division of the British Medical Association; Ministerial intervention failed to bring about an agreement, and the position grew worse by the introduction of heat into the argument. The medical men insisted on reasonable terms, and were prepared to make concessions for the duration of the war and six months after the declaration of peace. The Friendly Societies charged the doctors with an attempt to exploit the Lodge patients, and the public joined in the argument and introduced much irrelevant, abusive matter. The breach, already wide, was enlarged by the attitude taken up by the Minister of Public Health, who threatened the profession with pains and penalties if any steps



were taken to resist the importation of practitioners from America and Great Britain. In these circumstances, the Wellington Division of the New Zealand Branch of the British Medical Association issued in the public press an account of the position from the doctors' point of view, and have subsequently supplemented this statement by the publication of a pamphlet giving additional facts and arguments. The Friendly Societies have replied through the public press, and at considerable length have attempted to persuade the public that the doctors were well paid at 15s. per Lodge member, and that the refusal of the doctors to continue on the old conditions was unjustifiable and unwarranted. Unfortunately, the public is not likely to be able to appreciate the defects of the arguments used in the latter statement, more especially because many of the points at issue are obscured by a misleading presentation of facts.

In the statement issued by the Wellington Division, it is pointed out that the old rate of 15s. per member is a sweating rate. This rate works out at 3½d. per family per week, or less than 1d. per member per week. This rate has obtained for 25 years unchanged, notwithstanding the increase in the cost of living, of transit and of commodities generally. The Friendly Societies contend that the rate is sufficient, and support this view by two arguments. The first is that if the doctors would sanction the appointment of six doctors at £500 a year each, they could do the work without difficulty, and the salaries could be paid out of the members' contributions, without any increase. The fallacy of this argument is apparent to anyone who can make a simple calculation. Six doctors employed at £500 per annum each represents £3,000, which would be equal to 4,000 subscriptions at 15s. each. On the basis that each member commands attendance for a family of four, each of the six doctors would have to look after the health of 2,664 persons, and for this colossal amount of work he is to receive the munificent sum of £500 per annum! The Friendly Societies speak of allowing the doctor the right to conduct private practice. We might add—if he has time? But whether he had or not, he would have to keep a motor car, to live in a good house, to wear decent clothes, to provide himself with the usual accessories of medical practice and to meet the hundred-and-one expenses incidental to a doctor's life. Under these circumstances, only a man with ample private means could afford the luxury of being a Lodge doctor. The next argument is even more unreasonable. They claim that if the increased cost of living had rendered it necessary for the doctors to demand an increased rate of payment from Lodge members, why did they not raise private fees. Perhaps the Friendly Societies will tell the public that doctors have been so altruistic in the past as to render services to private patients for fees which were wholly inadequate. Otherwise, the doctors would have no reason to increase private fees.

The Wellington medical practitioners have arrived at a reasonable estimate of the value of Lodge practice. They put it at 30s. per member, but they

are prepared to make concessions during the course of the war. The Friendly Societies have attempted to mislead the public in regard to the concessions which were offered and which were refused by the Lodges. Not by all, for three of the Oddfellows have actually agreed to pay 21s. for the period of the war. At the conference arranged by the Minister, the delegates of the Friendly Societies stated that they had no authority to bind their Lodges, but that they would recommend them to increase the rate to 20s. The Minister advised the doctors to accept 20s. as a reasonable rate. But since the three Lodges of Oddfellows had agreed to a 21s. rate, the Wellington Division felt itself bound to make this an absolute minimum. As a matter of fact, the offer of 20s. from the Friendly Societies has never been made officially, and, consequently, the Division never had more than a verbal statement that the delegates would recommend this rate to go on. Notwithstanding this state of affairs, the Friendly Societies inform the public that they were willing to make a concession, representing an increase of 5s., while the doctors refused to reduce by more than 3s. their demand for a 9s. increase.

Another quibble (we would like to term it something else) is put forward by the Friendly Societies in regard to a medical man who took one of the appointments, but relinquished it within a very short time. The facts, as related in the statement of the Division, are that, as soon as this practitioner found out what the position was, he withdrew from the post. He discovered this by speaking to other practitioners privately, and was not called upon by the Division to account for himself. Since these appointments are blacklisted, any member of the Association who takes one would be called upon to explain his position. In this instance, the doctor in question realized his mistake, and resigned his appointment voluntarily. The Friendly Societies publish some letters from him, and inform the public that these letters mean that the doctor withdrew on account of the representations of the British Medical Association. The doctor in question was told by a few members that the doctors in Wellington were fighting for reasonable conditions of Lodge practice and wisely accepted this statement as a sign for him to return whence he came.

There are several other points of disagreement between the two statements to which it may be necessary to return at a later date, when fresh events alter the situation. At present, the Wellington Division is standing firm for a sound principle. The Friendly Societies are not acting in the best interests of their members in trying to obtain cheap attendance, for efficiency becomes impossible, especially in medical practice, if too little time is allowed for the performance of the work.

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We have been informed that Dr. J. S. Saunders, of Western Australia, who volunteered for service with the R.A.M.C. early in the war, has been promoted to the rank of temporary rank (supplement to the *London Gazette*, May 24, 1916).

## Abstracts from Current Medical Literature.

### SURGERY.

#### (53) Symptoms and Complications of Gunshot Wounds of the Solid Abdominal Viscera.

Surgeon-General Sir George H. Makins (*British Journal of Surgery*, April, 1916) has written a long article on the symptoms and complications of gunshot wounds of the solid abdominal viscera. He states that wounds of these organs, although common, do not possess the inherent gravity incumbent on those of the alimentary canal. Uncomplicated wounds inflicted by bullets are of little more importance than similar injuries involving the extremities. The diagnosis is easy, because the solid organs have so limited a range of movement and the track of the bullet is easily followed, and if the missile is retained it is easily localized by X-rays. Definite signs are more commonly detected in injuries of the liver and kidneys than in those of the spleen or pancreas. Wounds inflicted by fragments of shells or bombs, on account of the extensive lacerations and the fact that they are constantly carriers of gross infective material, are more to be dreaded than those caused by bullets. The author describes the wounds, treatment and prognosis of the solid organs separately. In bullet wounds of the liver, if the missile goes straight through the organ without impinging on a large blood vessel or bile duct, the symptoms may be hardly noticeable. The diagnosis may then be made from the direction of the bullet track. When other abdominal injuries exist concurrently, that of the liver may fall into a secondary position as far as danger to life is concerned. Mere excoriations or simple furrows may be the source of more troublesome and persistent hæmorrhage than the more serious-looking perforating wounds. The most common co-existent injury in the author's experience was involvement of the pleural cavity and lung. Thus, in 37 cases of injury to the liver the pleural cavity was traversed in 25 instances. In only one case of his own series did any considerable collection of bile take place in the peritoneal cavity; a wound of the common hepatic duct was present, in addition to a traversing wound of the liver. This patient was operated on on the eighth day, and a quantity of bile found in the pelvis. The right kidney had suffered comminution, and the patient died three days later of toxæmia. The causes of death in wounds of the liver in 25 cases showed that 60% of the patients died from some form of septic infection and 40% from secondary hæmorrhage. In wounds of the spleen, injury to some other organ is nearly always met with, and the diagnosis of isolated injury to

the spleen is rarely made on any grounds beyond the position of the external wounds and the direction made of the internal track. Knowledge of wounds of the spleen gained at the base hospitals has been obtained by the discovery of these lesions in operations or post-mortem examinations on patients the subjects of other injuries. As regards injuries to the pancreas, they are as difficult to detect, except by exposure, as are those of the spleen. In operating, the typical results of the escape of pancreatic secretion into the tissues and peritoneal cavity have been observed. Such injuries have usually proved fatal. Injuries to the kidneys, simple and severe, are also extensively dealt with in this article.

#### (54) Changes Produced by the Removal of the Gall Bladder.

Edward Starr Judd deals with the subjects of cholecystitis, and examines the nature of the changes caused by the removal of the gall bladder (*Boston Surg. and Med. Journ.*, June 8, 1916). He discusses the etiology of cholecystitis, and refers to Archibald's contention that pancreatitis is often, if not always, due to chemical changes in the pancreas. The author gives the many avenues by which bacteria may enter the gall bladder, and draws attention to the frequency of the co-existence of duodenal ulcer and cholecystitis, suggesting at the same time the probability that cases of cholecystitis are secondary infections caused by organisms from the duodenal ulcer reaching the gall bladder through the common duct. The function of the gall bladder and the effect of its removal are dealt with. Mayo and Deaver hold the opinion that the gall bladder is only a tension bulb, and that during fluctuations of pressure in the ducts the gall bladder may spare the parenchyma cells of the liver from backward pressure. These fluctuations of pressure probably occur as the normal consequence of digestion, or they may be due to pathological changes. Physiologists assert that the secretion of bile is continuous, but that its output into the duodenum varies with the period of digestion, and that the bile secreted by the liver in the interval must collect in the gall bladder, where it is concentrated by the absorption of water. Flexner has shown that if mucus from the gall bladder is mixed with bile, it is much less irritating to the pancreas. At the author's request, Mann and Sistrunk removed the gall bladder from several dogs. Examination later showed dilatation of the common duct. This dilatation invariably stopped at the surface of the liver, and there were no changes in the pancreas or pancreatic ducts. The dilatation was due to the action of the sphincter at the papilla of Vater, but eventually dilatation overcomes the sphincter, and if this be so the cure of inflammation of the pancreas by the removal of the gall bladder is explained. It is suggested that the severe reaction which often follows cholecystectomy is due to the bile salts being forced back into the pancreas by

the sphincter muscle. The mucus, which lessens this effect, is absent of necessity, because the gall bladder, which secretes it, has been removed. If Deaver's suggestion that the pancreatitis is due to lymphangitis, then the removal of the gall bladder, which is unquestionably the primarily infected organ, will cure the condition. Cases are quoted, and the author's method of removing the gall bladder is described.

#### (55) The Segregated Ileum as a Urinary Receptacle.

Vilray P. Blair (*Surg., Gynec. and Obstet.*, March, 1916) reports a case where he transplanted the trigonum into the segregated lower end of the ileum. The patient was a girl, æt. 6 years, with exstrophy of the bladder. He points out that the difficulty in these cases lies in preserving the blood supply of the trigonum, and in protecting the kidneys. The operation was done in two stages. The first consisted in the division of the ileum ten inches from the caecum, the proximal part being implanted into the ascending colon and the distal end closed. The idea was to use the ten inch segment of the ileum as a urinary receptacle, in the hope that the ileo-caecal valve would protect the ureters from ascending infection. At the second operation, done three months later, the segment of the ileum was found free from faeces. The trigone, with a ureter at each border, was separated from the abdominal wall and left attached to a triangular flap of peritoneum. Bleeding was free, and many ligatures had to be applied. Lateral implantation of the trigone into the lower segment of the ileum was easily made. There was no leakage of urine. The child did well for a year, holding the urine all night, and, during the day, passing it about each two hours, with plenty of warning. About one year after the second operation the child became ill and began to fail. When seen two months later she complained of symptoms suggesting the formation of urinary calculi in the new bladder. One month later she died. No autopsy was performed. According to the practitioner in attendance, the death was due to uræmia.

#### (56) Simple Goitre and its Treatment.

F. N. G. Starr (*Brit. Journ. of Surg.*, April, 1916) holds the opinion that medical treatment is of no avail for adenomata of the thyroid gland. He usually advises the removal of the tumour, even in early cases, as soon as possible. The operation is practically free from danger, and convalescence is usually completed within a month. He employs the collar incision. The sterno-hyoid and sterno-thyroid muscles are divided between Ochsner forceps as high up as possible. The superior thyroid vessels are also divided between forceps. A hole is made in the capsule anteriorly, of sufficient size to permit of the delivery of the tumour. A small single adenoma may be enucleated, but

when several growths are present, the whole lobe should be removed. Great care is required when the fascial capsule has been thinned out towards the inferior surface. Suture of the capsule and of the stump is effected by iodized catgut. Starting at the raw edge of the isthmus, the forceps clamping it are over-sewn, and the suture drawn tight. The same thread is used, without any knot, for the suture of the mesial cut edge of the capsule, and only one knot is made. The chief points ensuring success of the operation are a dry wound and the reduction of the amount of suture material, and especially of irritating knots.

#### GYNÆCOLOGY AND OBSTETRICS.

##### (57) Pregnancy and Tuberculosis.

C. C. Norris has made an exhaustive inquiry into the question of pregnancy in the tuberculous, and feels himself justified in drawing certain conclusions (*Amer. Journ. of Obstet. and Dis. of Women and Children*, June, 1916). The combination of pregnancy and tuberculosis of the lungs is a common one. He finds that while pulmonary tuberculosis does not apparently exert an influence against conception, and that while it exerts but little influence on the course of pregnancy, the continuance of pregnancy has a markedly baneful influence on the tuberculosis. About 20% of mild quiescent cases of pulmonary tuberculosis and 70% of more advanced cases exhibit exacerbations during pregnancy or the puerperium. The author arrives at this conclusion from the published statistics. Some observers have recorded an even higher percentage of exacerbations during pregnancy. He quotes a saying, variously attributed to Dubois and Louis, "If a woman threatened with tuberculosis marries, she may bear the first accouchement well; the second with difficulty, and the third never." He therefore advises that, unless the pulmonary lesions have been quiescent for a considerable period, tuberculous women should not marry. Tuberculous women should not become pregnant unless the disease is in the first stage, and has been quiescent for at least two years. He endeavours to set up some standard on which prognosis may be based, but realizes that the individuality of the patient and the type of the disease must be taken into consideration. Moderately extensive lesions, recent activity and the development of secondary lesions are bad prognostic signs. When the disease manifests evidence of becoming active, pregnancy should be interrupted. Before the end of the eighth week he advocates curettage, while in the latter months he prefers vaginal hysterotomy. In about 65% to 70% of all cases prior to the fifth month of pregnancy the emptying of the uterus is followed by an improvement in the mother's condition. Late intervention gives unsatisfactory results. After the fifth month of pregnancy an expectant treatment should be adopted, and the

endeavour should be to render the labour as easy as possible. The chances for the mother are improved under good hygienic and dietetic treatment. He points out that tuberculous women should not nurse their infants, and warns against the infection of the baby by kissing and other means. He gives an account of the work conducted in the Henry Phipps Institute, where prenatal control is exercised as a routine.

##### (58) Induction of Labour in Normal Pelves at Term.

Charles B. Reed (*Surg., Gynec. and Obstet.*, March, 1916) while admitting that the physiological duration of human pregnancy may vary from 240 to 330 days, states that it is definitely known that the child is fully mature in 275 days. He argues that if an apple is picked at maturity, why not a child. The estimate of maturity is based on the length and weight of the infant. A mature child measures 50 cm. and weighs between 5 and 8 lbs. The author measures the length according to Ahlfeld's rule. In vertex cases, the distance between the upper border of the symphysis and the breech is measured with the pelvimeter and the result doubled. Two centimetres are subtracted for the thickness of the abdominal wall. He also obtains information from a comparison of the foetal head with the maternal pelvis. A control is exercised when the patient is intelligent from the available data. The approximate date of quickening is 17 weeks after conception, and the culmination of the pregnancy may be taken at 22 weeks after quickening. Having determined the date when the labour is to begin, the following technique is followed: The patient is placed in an exaggerated lithotomy position; a retractor is applied and one lip of the cervix is seized by vulsellum forceps and brought down. If the os is not sufficiently patulous, dilators may be used. A Voorhees bag, completely emptied and rolled up, is introduced by means of a pair of long Pean forceps, with the curve toward the patient's left leg. As the bag enters the operator gives the mass a quarter turn to his left. The lock is then released and the bag slowly filled. The forceps are then removed. If uterine contractions do not start within an hour, a weight of one or two pounds may be attached. The author reports the results obtained in 100 consecutive cases in which the bag was used. The average duration of labour was 7½ hours. Two of the mothers died, one from *placenta praecia*, complicated with myocarditis, and one from pneumonia. Seven babies died. Forceps were used in 23 cases. Post-partum fever was noted seven times. He advocates this method of determining the date of labour, and claims that in his series only one mistake was made. This was due to a mistake on the part of an assistant in taking the measurements, with the result that a seven months' child was born.

##### (59) Occipito-Posterior Presentations.

E. D. Plass (*Johns Hopkins Hospital Bulletin*, June, 1916) publishes a sta-

tistical study of 635 labours with occipito-posterior presentations. He finds that the frequency was 11.57%, but recognizes that the foetal head may have been in this position more frequently. He has investigated the direction of spontaneous rotation with great care, and finds that in 14% of the cases it took place through 45° into the hollow of the sacrum. Poor flexion, small size of the head and a funnel-shaped pelvis are factors which tend to favour posterior rotation. Contraction of the pelvic inlet favours anterior rotation. The author is inclined to accept Hodge's explanation of anterior rotation from an oblique posterior position. When the head descends in the right occipito-posterior position, if the point of the occiput should strike upon the spinous process of the ischium or extreme boundary of the anterior inclined plane, it will be reflected anteriorly toward the edge of the pubis, and delivery will be effected, as in an original right occipito-anterior position. If, however, the point of the occiput should strike posteriorly to the spines of the ischium, it will be reflected backwards to the hollow of the sacrum. He states that premature rupture of the membranes was not unduly frequent. Spontaneous delivery was the rule, operative interference having been resorted to in 22.9% of the cases. He finds that the posterior position only called for operative intervention in about 11%. There was neither increased infantile mortality nor increased maternal morbidity or mortality.

##### (60) Gonorrhœal Infections of the Fallopian Tubes.

Robert C. Coffey deals with the surgical treatment of acute gonorrhœal infections of the Fallopian tubes, by means of what he describes as a "quarantine pack" (*Surg., Gynec. and Obstet.*, February, 1916). Acting on the established principle that the only hope of curing gonorrhœa in the female is by early and free drainage, the author packs the vagina once a day with dry gauze, in preference to douching and applying strong solutions. When the tubes are infected, he operates at once. He refers to three very early cases, in which he was able to squeeze pus from the open fimbriated ends of the Fallopian tubes when the abdomen was opened. He has apparently obtained a permanent cure by means of the quarantine pack, without the removal of the tubes. The technique for employing the pack is as follows: The pus is first cleared out; the intestines are packed out of the pelvis; if the fimbriated ends are sealed the tubes are removed; twenty to thirty gauze wicks are inserted far down into the pelvis; the wicks are covered by a sheet of gutta percha tissue, in order to prevent all possibility of contact of the intestines with the gauze; and, lastly, another gutta percha sheet is placed between the *fundus uteri* and the gauze. The gauze wicks are removed on the sixth day, and the gutta percha tissue on the fourteenth day. The author states that he has never seen a hernia follow this operation.



## BRITISH MEDICAL ASSOCIATION NEWS.

(Continued from page 118.)

Dr. B. T. Zwar asked Mr. Russell whether, in the case of a fractured maxilla in which the bone had been destroyed, it would not be possible to use a portion of a resected rib as a support for artificial dentures.

Dr. H. Douglas Stephens said that Mr. Russell had stated that the extensor group of muscles of the leg could not affect the position of the fragments if the calf muscles were relaxed. He was inclined to believe that this statement was incorrect, unless it were restricted to the cranial half or two-thirds of the leg. He agreed with some of Mr. Russell's criticisms of the older methods. He had seen the leading exponent of the operation treatment of fractures operate upon a child, one month old, who was suffering from an obstetric fracture of the upper end of the humerus. These fractures were not uncommon, and, as a rule, they did well under a simple method of treatment. In the case referred to, the surgeon applied a plate one inch long with two screws. Of course, the screws came out of the soft bone at once. He then used silver wire wound around the fragments and including the plate, and then sewed up the wound. It was, in his opinion, a barbaric method of treating a simple case. At the Children's Hospital he often used a Thomas's ring splint extension, the extension being produced by means of strapping. The results had been exceedingly satisfactory. When overlapping was extensive and extension under chloroform did not obviate the shortening, open operation had yielded the best results. He had obtained good results in infants by suspending the limb at right angles to the trunk. This was a clean method, but unless the patient were watched closely, buttock movements could occur. He asked Mr. Russell whether his method were applicable to little children under four years of age. He held the opinion that insufficient control of the trunk in these cases might lead to undue mobility of the fragments.

In his reply, Mr. Hamilton Russell said that he could not altogether see eye-to-eye with Mr. Syme. In his opinion, the object of treatment should be simply to obtain the best possible result in the shortest possible time, with the minimum of discomfort. A patient who had broken his thigh wanted to get back to his work, and, if he were wise, he would care little for either learned talk about "exact anatomical restoration" or for the beauties of a skiagraph showing plates and screws.

Mr. Russell showed the members present a Hay-Groves apparatus, resembling a horseshoe with a rod connecting the open ends of the shoe. The rod was passed through the condyles of the femur and extension was applied by means of pulleys attached to the shoe. A soldier had returned from England with this apparatus. Needless to say, it had been removed immediately. Although its use was growing in England, it was a barbarous instrument. He trusted that no one in Australia would think it good surgery to make use of such an appliance. Mr. Syme had referred to the division of the *tendo Achillis*. If it were possible to put the muscles of the leg at rest by adopting the simple method advised, it would obviously be quite unnecessary to divide the *tendo Achillis*, and this would therefore be wrong. In reply to Dr. Zwar, he regretted that he had had but little satisfactory experience of applying a graft of rib in jaw cases. All transplantations into the jaw had been discouraging, and he would welcome any suggestion on the subject.

Replying to Dr. Stephens, he said that it was quite conceivable that fragments close to the ankle might be influenced by the extensor group; as a general rule, all muscles save those of the calf might be disregarded. He thought that his method could be applied with satisfaction to children. A former "resident" at the Children's Hospital had used the apparatus with success, but, unfortunately, its use had not been persisted in.

A meeting of the New South Wales Branch was held on June 30, 1916, at the B.M.A. Building, 30-34 Elizabeth Street, Sydney, Dr. Sinclair Gillies, the President, in the chair.

Professor D. A. Welsh and Dr. W. S. Brown read a paper on the specific treatment of epidemic cerebro-spinal meningitis (see page 113).

Dr. W. F. Litchfield expressed his indebtedness to Professor Welsh and Dr. Brown for their important and valu-

able contribution. He would have liked to have heard of some other results besides those in the six cases recorded. He considered that the fact had been conclusively established that the serum was a valuable remedy in epidemic cerebro-spinal meningitis. This disease had been among us for a long time, and was going to stay. He had seen many epidemics and various forms of the disease in the Children's Hospital. He wished to know what happened in chronic cases after serum had been applied. His experience taught him that the exhibition of serum did not have much effect in chronic cases. He pointed out that intensive treatment, i.e., an injection given every day for three or four days, had frequently been recommended and adopted. It was not always necessary to induce anaesthesia for a lumbar puncture, even in children. Dr. Litchfield referred to various cases in his own practice, in which spontaneous recovery had taken place, notwithstanding the severity of the attack or the suddenness of the onset. He asked Professor Welsh if he had had any experience of blue ointment inunction. He had applied it in children suffering from epidemic cerebro-spinal fever in an apparently hopeless condition with seemingly good results. He suggested that, in the absence of serum, blue ointment might turn the scale. In conclusion, he held the view that the association of the pathologist and the physician should prove very valuable.

Dr. J. B. Cleland felt doubtful whether the ultimate result of antiserum treatment would be as great as Professor Welsh was inclined to think. It was difficult to understand how the antiserum could distribute itself sufficiently widely throughout the spinal canal to enable the antibodies to attack and destroy the meningococci. He asked Professor Welsh whether he had carried out experiments with a view to determining what was the lowest dilution of antiserum that would kill meningococci in culture. He also asked whether the serum treatment was as successful in gonorrhoea as it was in cerebro-spinal meningitis.

Dr. Sinclair Gillies was inclined to the opinion that the authors were not justified in forming conclusions on three acute and three chronic cases. He referred to the experience of past epidemics. In one small epidemic the type of the disease had been mild, and all the patients had recovered. On the other hand, he recalled an epidemic with a mortality of 60%.

Dr. W. St. John Dansey entertained considerable doubt as to the success of Flexner's serum in the treatment of epidemic cerebro-spinal meningitis. Care should be exercised before big conclusions were drawn from small premises. He was of opinion that the antiserum should be used in these cases, and that Professor Welsh's method was the only one of real value. In some cases he had given up the treatment by serum after several injections, because the cocci persisted in the spinal fluid. If means could be discovered to overcome the hydrocephalus, the outlook would be enormously improved. He asked Professor Welsh how early in the acute cases the patients got the serum. Referring to the question of reinfection from the nose and pharynx, he stated that an immunity was gradually acquired, and, consequently, reinfection became improbable.

Dr. Dansey held that it did not need any minute anatomical knowledge to demonstrate that there was no hope of the antiserum reaching all the nooks and corners. He thought that it was unlikely that any of the serum would reach the brain, if 30 c.cm. were injected into the lumbar region. It was admitted that the disease was a septicaemia from an early stage, and that the meningococcus obtained access to the subdural space. He asked whether there was any proof against the infection being ventricular from the first. He spoke of attempts to wash out the cerebro-spinal axis. This was quite easy. Unfortunately, the ventricles escaped in the process of washing out. He thought that it might be worth while to proceed along these lines, and expressed the opinion that it was probably better than lumbar injection. He also questioned the value of urotropin in the spinal canal. Professor Welsh has spoken of continuous suppurative inflammation in chronic cases. After a week or ten days the cerebro-spinal fluid was usually clear, and no longer contained pus cells. This was an important point, since suppurative inflammation led to a closure of the foramen of Magendie. In conclusion, he stated that more evidence was required before Professor Welsh's rosy picture could be accepted.



Dr. R. Gordon Craig spoke of the futility of giving urotropin for its action in the spinal fluid. It had been proved that urotropin was of no use at all in an alkaline medium. Free formaldehyde was only liberated in an acid medium, *e.g.*, urine. The action of urotropin depended on the presence of free formaldehyde. It had no value as an antiseptic in an undissociated state.

Dr. J. B. Cleland moved and Dr. W. F. Litchfield seconded that a special meeting should be set aside for the discussion of the treatment and prophylactic measures of epidemic cerebro-spinal fever.

The motion was carried.

In his reply, Professor D. A. Welsh stated that chronic cases frequently dragged on indefinitely when no antiserum was given. The cocci penetrated deeply, and might reach the ventricles. For this reason he held that the first 24 hours were critical, and that the antiserum should be given in this period. He had had experience of many other cases besides the six on which he had reported. He spoke of a dramatic recovery in one case. He was aware that the intensive treatment had been used by others, but it had not been used at the Royal Prince Alfred Hospital in 1915, nor in all the military camps. Replying to Dr. Cleland, he expressed the opinion that the antiserum had a good chance of reaching the parts affected in the early stages, before the meningococci had penetrated deeply. The cocci disappeared from the fluid after one or two injections. He had not carried out any experiments on the anti-bacterial power of the serum *in vitro*. He thought that it was possible that good results might be obtained from antiserum in gonorrhœa. While he agreed with Dr. Gillies that the number of his cases was very small, he pointed out that they represented the same class of case as that received at the same time at the Royal Prince Alfred Hospital. It was a virulent epidemic. The experience of physicians who did not use antiserum was less favourable.

The majority of the cases were diagnosed within the first 24 hours of the illness, and the first injection carried out as soon as the patient was admitted into hospital. He thought that it was just possible that there was a ventricular infection from the beginning. He admitted that the chronic process was not necessarily a suppurative one. The inflammatory condition, however, did not pass off in his cases. He was willing to modify the statement by substituting inflammation for suppuration.

The following have been nominated for election to the New South Wales Branch:—

Dr. P. J. O'Shea, Sydney Hospital.  
Dr. Stanley A. McDonnell, Sydney Hospital.  
Dr. Harry Leaver, Sydney Hospital.  
Dr. C. C. Humphries, Sydney Hospital.  
Dr. T. G. Allen, Balmain Hospital.

## Correspondence.

### CRIMINOLOGY AS A BRANCH OF MEDICINE.

Sir,—In the *Journal* of July 8, Dr. Lind, Pathologist to the Victorian Lunacy Department, touched at great length on a matter of much moment in the adjustment of the views of the Bench and the medical profession on matters of criminal importance.

Many attempts in this connexion have been made in England, the latest being in 1915, when the Council of the British Medical Association submitted to the Annual Representative Meeting a "Report of Crime and Punishment Sub-Committee on the Present State of the Law with regard to the Legal Responsibility for Crime." This Committee, which consisted of members of the Medico-Political Committee, having power to add to their number, did so by appointing Earl Russell and Mr. Rowland Burrows (Medico-Legal Society), Dr. James Scott and Dr. Percy Smith (Medical Psychological Association), Mr. E. A. Mitchell Innes, K.C., and Mr. Theobald Mathew (Bar Council, and Sir Homewood Crawford, with Mr. A. J. Morton Ball (Incorporated Law Society).

This report is very definite in its opinions, and, on the subject of the "Legal Responsibility for Crime," states that

certain points "might be accepted by the medical profession as a fair definition of responsibility for crime in preference to the ruling laid down by Sir James FitzJames Stephen" in the celebrated Macnaughten case, in which Sir James suggested modifications widening the narrow definition laid down in the earlier cases, which, however, have not received judicial or legislative sanction and have, as yet, no other authority than that derived from the reputation of the author. It also states that "It follows from the different objects which Law and Medicine have in view that the tendency of legal practice is to restrain insanity within narrow limits, while Medicine favours extension of these limits." It would appear to me that the main thing to do is to persuade, by medical knowledge, the presiding judge that there are cases in which the commission of an act is known to be wrong, but, as a result of disease, is believed to be the right thing to do. This, of course, applies to capital offences. In minor matters, our judges and magistrates are wonderfully correct in summing up the position and meting out punishment or holding it in abeyance on medical advice, and thus confirming the opinion of the prison doctor. On this point it is well to note the sub-committee's opinion that "It is desirable that medical officers of prisons should have had experience in the diagnosis and treatment of insanity," and sets forth that "no one who has had practical experience of the way in which prison doctors give evidence can fail to appreciate their impartiality, and their evidence is practically always accepted. Where they have any doubt they advise before the trial that another opinion be obtained, and that opinion is also available at the trial." "In such cases, therefore, we are of opinion that the court is aided by impartial medical opinion." I quite agree with Dr. Lind in his opinion that medical men not skilled in lunacy matters should not be called by the court to give evidence, and the instance he quotes fully justifies that position. The report goes on to state that, "in other cases, the question of sanity or not is difficult to determine, and it is important that medical evidence should be called on both sides; obviously, an honest difference can be entertained. It may be objected, and with considerable force, that a jury is not qualified to decide such an issue, but we venture to suggest that argument, however cogent, cannot be relevant because it is impossible to effect a change in the jury system for important crimes."

Dr. Lind next turns to the "Determination and Administration of Sentences" imposed upon criminals, and these "should be guided throughout by the advice of experienced, full-time Government medical officers, such as we have in Hospitals for the Insane"; but surely these cannot usurp the functions of the court, and on this I have nothing to say, beyond that, in many cases within my own experience as medical examiner for the court or for the prisoner's friends I have found no need for it, and I do know relatives of prisoners are naturally anxious that the issue should not depend entirely upon official evidence, but that some one of their own or their counsel's selection be asked to examine, report and give evidence, and why should they not? I see no justification for importing asylum doctors perforce into criminal matters, because in no community can it be said that they are as such exclusively fitted for the position. The prison doctor, who has had experience in the diagnosis and treatment of insanity, is the man for this work, as has already been quoted, and then only if he is the right man.

A matter of great importance is the effort to arrive at agreement amongst the medical witnesses before giving evidence. Medical men are too ready to frame their opinions on the prisoner's statements or those of their solicitors, without having heard the sworn evidence; the agreement cannot always be depended upon; the pressure of cross-examination may lead to partisan feeling, and the examination in chief even may fail of its purpose, as agreed upon.

The knowledge of right and wrong, Dr. David Nicolson states, "is not a bad rough-and-ready test for use in a court of law, and the question is one which a medical witness ought to be prepared to answer, and he adds: (1) If he can say the prisoner did not know right from wrong, let him say so; (2) If he has an opportunity of saying the prisoner knew right from wrong, but that his power of control was in abeyance, let him say so; and (3) If he be-

lieves the prisoner knew right from wrong absolutely, let him say so."

With the giving of his evidence as the result of examination and the hearing of all sworn testimony, the medical man completes his function. The responsibility for the crime is for the judge to explain to the jury, and it is no part of the medical witness to state his opinion upon that; rather is it laid down by recognized teachers that he has every right to decline to answer such a question put to him, and Dr. Lind need have no fear about "the peace of mind of the presiding judge" and the deciding of the question of "responsibility or the suitability of the punishment" may safely be left in the hands of the law, which in all cases deals benevolently with prisoners and in the interests of the community. I would only plead that, where there is an acknowledgement on the part of the judge that the prisoner was insane, that a verdict of "guilty, but insane" be passed in fairness to the prisoner and in full satisfaction of the peace of the community that the prisoner is cared for and the public protected. It also ensures that, where a prisoner is deemed fit to plead, he knows he has been tried. In this contention I am supported by a recent case, in which the Bench preferred to adhere to the House of Lords decision, and while his Honour stated he believed the prisoner to be insane, he directed the jury that they could only find the accused insane if they were satisfied her mind was so diseased that at the time of the act she did not know what she was doing, or if she did she did not know that it was wrong, and that there were two verdicts the jury could give—guilty of murder, with or without recommendation to mercy, or they could find accused not guilty, on the ground of insanity. The verdict was guilty, with a strong recommendation to mercy, which his Honour said he would endorse. Sentence was passed, the prisoner went back to gaol and the Executive later ordained that she be imprisoned for 10 years and thereafter be detained at the Governor's pleasure. Truly, a ruling that the woman was guilty and not guilty at the same time; she was subsequently certified as insane. A verdict that she was guilty of the act but not of the crime would have been in keeping with the evidence, both of the Crown and the prisoner's medical examiners. On this matter there is a recent decision in England on the verdict of "guilty, but insane," which states that the accused was guilty of the offence charged, but that he was not guilty of the act charged as an offence. He was not guilty of the offence, because if the act charged is done in a state of insanity there is no *mens rea*. Thus, the verdict "guilty, but insane," is not a conviction, and without a conviction the court of criminal appeal has no jurisdiction. So what can you do with the law?

The complexity of the whole question is very adequately dealt with in the *British Medical Journal* of September 13, 1913, by Dr. Nicolson, as well as editorially, and in the *British Medical Journal* of April 18, 1914, in an editorial on "Appeal in Criminal Lunacy," with medico-legal addenda. The Committee's report, like many other matters, is in abeyance on account of the war.

The speculative aspect of the anthropologist and the criminologist is, as Dr. Nicolson says, a dangerous doctrine, and he states his reasons why.

The whole question has been raised in Australia before, and Dr. Lind's article may keep it alive, if it does nothing else.

Yours, etc.,

W. BEATTIE SMITH.

Melbourne, July 31, 1916.

#### THE METRIC SYSTEM IN PRESCRIBING.

Sir,—When recommending, at the request of my Council, the metric system in prescribing to the South Australian Branch of the British Medical Association, I did not foresee the possibility of having to defend it in the pages of our journal. Still, it is well to have all objections to it made public, then they can be fully considered; some perhaps may be found fallacious, and others may possibly be overcome.

The writer in your issue of July 29 (p. 83) says the reason why the metric system in prescribing has been an abject failure in all English-speaking countries, and even in the

United States, where the metric system of coinage is regarded as perfection, is the small size of the unit of coinage, *viz.*, the cent, which never requires subdivision, and the large size of the unit in prescribing, *viz.*, the gramme. But is there not here a fundamental mistake? The unit of coinage is not the cent, but the dollar. "An Act of Congress of March 3, 1849, directed the coinage of gold dollars" of standard weight and composition, "and by Act of February 12, 1873, this was declared the unit of value of the United States." Sums of money are written as so many dollars, then comes the decimal point, followed by so many cents. The nickel dime is the tenth part of the dollar, and the copper cent is the hundredth part. So, also, the unit in prescribing is for solids the gramme, and we have its tenth and its hundredth part, the decigramme and centigramme, and for liquids the mil, with the decimil and centimil, corresponding exactly with dollar, dime, and cent. Why should it be more difficult for people acquainted with the decimal system to use as the unit the gramme or the mil rather than the dollar?

He says "the gramme has no analogy to the cent or the millièrme, both indivisible units in coinage." Of course it has not, because it does not correspond to either of them; it corresponds to the United States dollar and the Egyptian pound, and so has its analogy with these and not with their hundredth and thousandth part, the cent and the millièrme. This last coin is the tenth part of a piastre, which is the hundredth part of an Egyptian pound, and hence, as its name implies, is the thousandth part of the pound, which is the unit of Egyptian coinage introduced in 1885. But there is the closest analogy between the gramme and the U.S. dollar and the Egyptian pound, between the centigramme and the cent, and between the milligramme and the millièrme.

Then, as to the cent and the millièrme being "indivisible units in coinages," the Adelaide Museum has in its collection several half-cents issued by the U.S.A., and the Egyptian Government has circulated one-half and one-quarter millièmes in bronze. These are not the units of coinage, but very small decimal parts of units, and these are even divided up, but "the unit in decimal coinages" is not "always a small coin, which never requires subdivision," but a large coin, which requires subdivision into a hundred or even a thousand parts.

Dr. Henry says "it is not an easy thing to use decimals downward for division into amounts below the unit. It requires a mental process from which the average man instinctively shrinks. . . . I wish to emphasize that, although eminently advantageous for multiplication, the metric system is not suitable for division into amounts lower than the unit." This is certainly a novel impeachment of the metric system, that division is so much more difficult than multiplication, and especially in decimals below the decimal point, as to make one shrink from the mental process. This is scarcely credible to one who has safely negotiated not only multiplication but even division in decimals at school, and has had to pass a matriculation examination for his degree or diploma. Not even the additional emphasis of the writer is sufficient to establish his remarkable proposition.

Another objection raised is that the gramme is too large a unit. "It is many times the weight of the lethal dose of many alkaloids which we prescribe in therapeutic doses." But so is the grain. We cannot prescribe atropine, strychnine, morphine, cocaine, hyoscyne, or digitaline in grain doses. And here the metric system has an advantage over the Imperial, we can order centigrammes or milligrams, or tenths or hundredths of these, and we can learn from our British Pharmacopoeia in these terms exactly how much we can give; and if we wish we can write down these words on our prescriptions, so as to avoid mistake. On the other hand, one might say with equal force that the grain and the minim are too small; for a very large proportion of our drugs have to be given in doses of drachms or ounces, and if we think in grains and minims we have to do considerable multiplication and some division by 60 to bring our quantities into drachms. As a matter of fact, we do not think in either grains or drachms alone, but in both, and we have learned to associate some preparations with the former and others with the latter; just as we shall learn to think in grammes, decigrammes and centigrammes re-

spectively if we will memorize the metrical dosage of our pharmacopœia, as we have memorized the Imperial.

That "ten can be divided only by two and five, while twelve can be divided by two, three, four and six," is true but somewhat irrelevant. Prescribing is effected by writing, not by speaking, and the metric unit can practically be divided by any figure required, from 1.0 down to 0.1 or 0.001. It is true also some vulgar fractions cannot be expressed in decimals, such as one-third or one-sixth; but although this may be mathematically correct, it makes no practical difference in prescribing; 0.3 or 0.17 are sufficiently near to meet all requirements. Since we should suit our dosage to the varying age of children and the size and strength of adults, we have a much more exact and elastic method in the metric than in the Imperial system.

The success of the metric system in prescribing is not, as the writer suggests, a question of "making the system more in accordance with natural instincts in calculation." It is questionable whether there are such instincts; it is a matter of education, along certain lines. If children or adults are sufficiently educated in the metric system, to understand it, they can then be taught to apply it in certain departments, and can easily use it. The United States children apply it to coinage, but not to weights and measures, not from any instinct in calculation, but simply because the former is taught to them and daily practised, and the latter is not; the children of France not to coinage alone but to weights and measures as well, because they have been taught and practise both. And with us it is no question of natural instinct in calculation, but of education. Our education did not cease when we left school; we have had to learn and unlearn many things since then, as those can testify who studied chemistry in the early 'sixties, and we can easily educate ourselves in the metric system of prescribing. If we will furnish ourselves with a 1914 British Pharmacopœia, and either commit to memory or a little pocket-book the metric dosage therein contained, and proceed to write our prescriptions as therein suggested, we shall find no great initial difficulty, and, by practice, it will soon become comparatively easy. And this we can do, and still use an Imperial coinage, while this endures.

The proposal to make a weight equal to the decigramme a new unit of dosage for solids, and one-tenth of the bulk of the cubic centimetre the liquid unit, and to discard the decimal division of these and return to the vulgar fractions  $\frac{1}{2}$ ,  $\frac{1}{4}$ , etc., and keep the decimal system in multiplying, and so retain the gramme and cubic centimetre is unthinkable. The writer himself regards it as impossible of general adoption.

As to the inadvertent displacement of the decimal point being a source of danger, one cannot deny it, but the writer's proposal of his hybrid system would scarcely obviate it, as one sentence in his letter proves, for he writes "a gramme or deci-c.cm. would be ten times the respective units," that is, the gramme would be ten times the decigramme, which is correct, and the deci-c.cm. would be ten times "the tenth of the bulk of the cubic centimetre," that is, the deci-c.cm. which, of course, is an error, for they are identical. The mistake, even in the use of the actual words, is plain. The truth is, we are liable to make mistakes inadvertently with any system. We are liable to this with our Imperial system, and prescribe quantities of individual drugs too large or too small, or to give 3 i. instead of 3 ii. or of 5 ss. as doses. But such errors are to be avoided, not by adopting one system of prescribing rather than another, but by eliminating hurry and carelessness and conversation on our own part or our patients while we are writing our prescription.

America, or, as we should more correctly say, the United States of America, which is a much smaller place, should be a warning to us rather than an example, and an encouragement and incentive to devote what time and mental concentration may be necessary to learn the metric dosage of our 1914 Pharmacopœia, and begin to use and persevere in the practice of the metric system in prescribing.

Yours, etc.,

JOS. C. VERCO.

Adelaide, August 4, 1916.

## SURGICAL ANÆSTHESIA.

Sir,—On page 74 of the *Journal* issued July 29 there is a review of Mr. Bellamy Gardner's book, "A Manual of Surgical Anæsthesia." In this review appears the remarkable statement, "the third stage of anæsthesia is not reached in Australia until this reflex (i.e., corneal reflex) is abolished. It has been universally taught in this country that the absence of the corneal reflex indicates the onset of surgical anæsthesia. Many surgeons expect a further degree of anæsthesia, without complete muscular relaxation."

In my experience, in very few cases indeed is it necessary to abolish the corneal reflex during a surgical operation. Sometimes it may be required in operations in the upper abdominal regions. But muscular relaxation is readily obtained in the vast majority of cases, with a corneal reflex quite marked.

The teaching that the commencement of surgical anæsthesia is when the corneal reflex is abolished is certainly not universal in Victoria; in fact, I doubt very much if such a doctrine has any here to uphold it.

From my experience with many surgeons, I can confidently deny that many of them require or expect a degree of anæsthesia further than that obtained when the corneal reflex is lost, and I also dispute the reference that complete muscular relaxation is obtained only when the patient is pushed beyond abolition of the corneal reflex. If the airway is kept patent, a big factor is obtained towards muscular relaxation, and, consequently, less deep anæsthesia is required.

Yours, etc.,

FRANK T. DAVIES.

148 High Street, Malvern,  
Victoria, August 1, 1916.

## ASTHMA, ITS CAUSE AND TREATMENT.

Sir,—Dr. Kent Hughes' letter in the July 29 number of the *Journal* is a little involved, but, with your permission, I will refer to the points *seriatim*. He states:—

(1) That there are quite a large number of cases of asthma with an absolutely normal nose. I maintain that this is not so. No asthmatic has a normal nose.

(2) That there are only two on this side of the globe who are out-and-out supporters of Francis. Does this not look suggestive as to the value of the method?

(3) That blood pressure can be reduced by the use of cantry in the nose. As far as is known, there is little if any, relationship between asthma and blood pressure. An asthmatic may have a systolic blood pressure of 115 or 250. If this latter pressure be due to arterio-sclerosis, chronic interstitial nephritis, etc., there are means of reducing it to safe limits, apart from burning the nose, but the reduction has no effect on the asthma. In fact, the drug that relieves an attack of asthma quickest, and for the longest period is adrenalin, and this increases the systolic blood pressure *pro tem*.

(4) Asthma spots are supposed to be hyperæsthetic nerve endings. If hidden by a cautery scar, the whole area has to be excised, thereby causing the removal of a larger amount of tissue than would otherwise have been the case.

(5) That the snipping of the mucosa of the turbinate anteriorly is bad surgery. I agree; in any case, I can't see that it would do any good.

(6) The septal spurs have never had the slightest effect on asthma in his experience. If a septal spur touches an excitable area on the opposing turbinate in an asthmatic, it will start an attack which will continue until the contact has been broken.

(7) I am conversant with Francis' method: I do not state that the method was intended to destroy asthma spots, or even refer to the method. What I did intend to convey was that if an asthmatic had had the cautery applied previously by anyone for any cause, the scars produced often made the work of finding exciting causes much more difficult. I further believe that nothing can be done with the cautery that cannot be done without it, and I may add that Gile, in the latest edition of his work (1915), states that the cautery has been given up in America, as far as the



middle turbinate is concerned, owing to the number of cases of meningitis following its use.

Yours, etc.,

W. W. EWBANK.

2 Collins Street, Melbourne,  
August 5, 1916.

P.S.—In paragraphs (4) and (7) I have left out Dr. Kent Hughes' statements to save space, and his letter must be referred to.

### Books Received.

HOSPITAL LABORATORY METHODS FOR STUDENTS, TECHNICIANS AND CLINICIANS, by Frank A. McJunkin, A.M., M.D. 1916. Philadelphia: P. Blakiston's Son & Co.; Demt Svo., pp. 139. Price, \$1.25 net.

THE PRACTICAL MEDICINE SERIES: VOL. II, GENERAL SURGERY, Edited by John B. Murphy, A.M., M.D., LL.D., F.R.C.S., F.A.C.A.; under the direct Editorial Charge of Charles L. Mix, A.M., M.D., Series 1916. Chicago: The Year Book Publishers; Crown Svo., pp. 620. Price, \$2.

SURGICAL AND GYNECOLOGICAL NURSING, by Edward Mason Parker, M.D., F.A.C.S., and Scott Dudley Breckinridge, M.D., F.A.C.S.; 1916. Philadelphia and London: J. B. Lippincott Company; Sydney: Angus & Robertson; Demt Svo., with illustrations; pp. 425. Price, 10s. 6d. net.

### Medical Appointments.

Dr. R. H. Pulleine has been appointed by the Government of South Australia a member of the State Medical War Committee, in the place of Dr. A. F. Lynch, who has resigned this appointment.

Dr. A. W. Morgan has been appointed Acting Officer of Health for the Bellarine Shire, Victoria, during the absence of Dr. McPhee on active service.

Dr. H. Bowen James, of Wallaroo, South Australia, has been appointed a Public Vaccinator.

Dr. Arthur Chenery, Government Medical Officer, Wentworth, New South Wales, has been appointed an Inspector under Section 50 of the "Cattle Slaughtering and Diseased Animals and Meat Act, 1902."

Dr. Martin Magill, Government Medical Officer, Bingara, New South Wales, has been appointed an Inspector under Section 50 of the "Cattle Slaughtering and Diseased Animals and Meat Act, 1902."

Dr. Edward Spring, of Moonee Ponds, Victoria, has been appointed Certifying Medical Practitioner under the "Factories and Shops Act, 1915," on the recommendation of the Board of Public Health, Victoria.

### Medical Appointments Vacant, etc.

\*For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xix.

Education Department, South Australia, Medical Inspector.

Thursday Island Hospital, Medical Officer.

### Medical Appointments.

#### IMPORTANT NOTICE.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C.

Branch.	APPOINTMENTS.
QUEENSLAND.	
(Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.)	Brisbane United F.S. Institute.
WESTERN AUSTRALIA.	
(Hon. Sec., 230 St. George's Terrace, Perth.)	Swan District Medical Officer. All Contract Practice Appointments in Western Australia.

Branch.  
SOUTH AUSTRALIA.  
(Hon. Sec., 3 North Terrace, Adelaide.)

#### APPOINTMENTS.

The F.S. Medical Assoc., Incorp., Adelaide.

Department of Public Instruction—New Appointments as Medical Officer, Ophthalmic Surgeon, Ear, Nose and Throat Surgeon, Physician.

Australian Natives' Association.

Balmal United F.S. Dispensary.

Canterbury United F.S. Dispensary.

Leichhardt and Petersham Dispensary.

M.U. Oddfellows' Med. Inst., Elizabeth Street, Sydney.

Marrickville United F.S. Dispensary.

N.S.W. Ambulance Association and Transport Brigade.

North Sydney United F.S.

People's Prudential Benefit Society.

Phoenix Mutual Provident Society.

F.S. Lodges at Casino.

F.S. Lodges at Lithgow.

F.S. Lodges at Orange.

F.S. Lodges at Parramatta, Penrith, Auburn, and Lidcombe.

Newcastle Collieries — Killingworth, Seaham Nos. 1 and 2, West Wallsend.

NEW SOUTH WALES.  
(Hon. Sec., 30-34 Elizabeth Street, Sydney.)

VICTORIA.  
(Hon. Sec., Medical Society Hall, East Melbourne.)

NEW ZEALAND:  
WELLINGTON DIVISION.  
(Hon. Sec., Wellington.)

Brunswick Medical Institute.

Bendigo Medical Institute.

Prahran United F.S. Dispensary.

Australian Prudential Association Proprietary, Limited.

National Provident Association.

Life Insurance Company of Australia, Limited.

Mutual National Provident Club.

F.S. Lodges, Wellington, N.Z.

### Diary for the Month.

- Aug. 15.—N.S.W. Branch, B.M.A., Executive and Finance Committee.
- Aug. 16.—W. Aust. Branch, B.M.A., General.
- Aug. 16.—North Eastern Med. Assoc. (N.S.W.).
- Aug. 17.—City Med. Assoc., N.S.W.
- Aug. 18.—Q. Branch, B.M.A., Council.
- Aug. 25.—N.S.W., Branch, B.M.A., Branch.
- Aug. 29.—N.S.W., Branch, B.M.A., Medical Politics Committee, Organization and Science Committee.
- Aug. 30.—Vic. Branch, B.M.A., Council.
- Aug. 31.—S. Aust. Branch, B.M.A., Branch.
- Sept. 1.—Q. Branch, B.M.A., Branch.
- Sept. 6.—Cent. South. Med. Assoc. (N.S.W.).
- Sept. 6.—Vic. Branch, B.M.A., Branch.
- Sept. 8.—N.S.W. Branch, B.M.A., Clinical Evening.
- Sept. 8.—S. Aust. Branch, B.M.A., Council.
- Sept. 12.—Tas. Branch, B.M.A., Branch and Council.
- Sept. 12.—N.S.W. Branch, B.M.A., Ethics Committee.

#### EDITORIAL NOTICES.

Manuscripts forwarded to the office of this Journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney, New South Wales.